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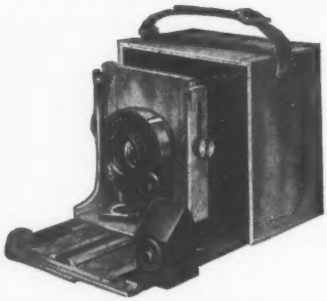

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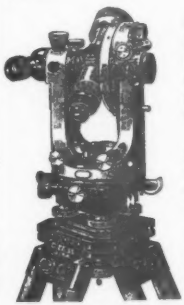

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The
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THE HEJAZ: *The fourth "Asia Lecture," read at the Evening Meeting of the Society on 3 November 1930, by*

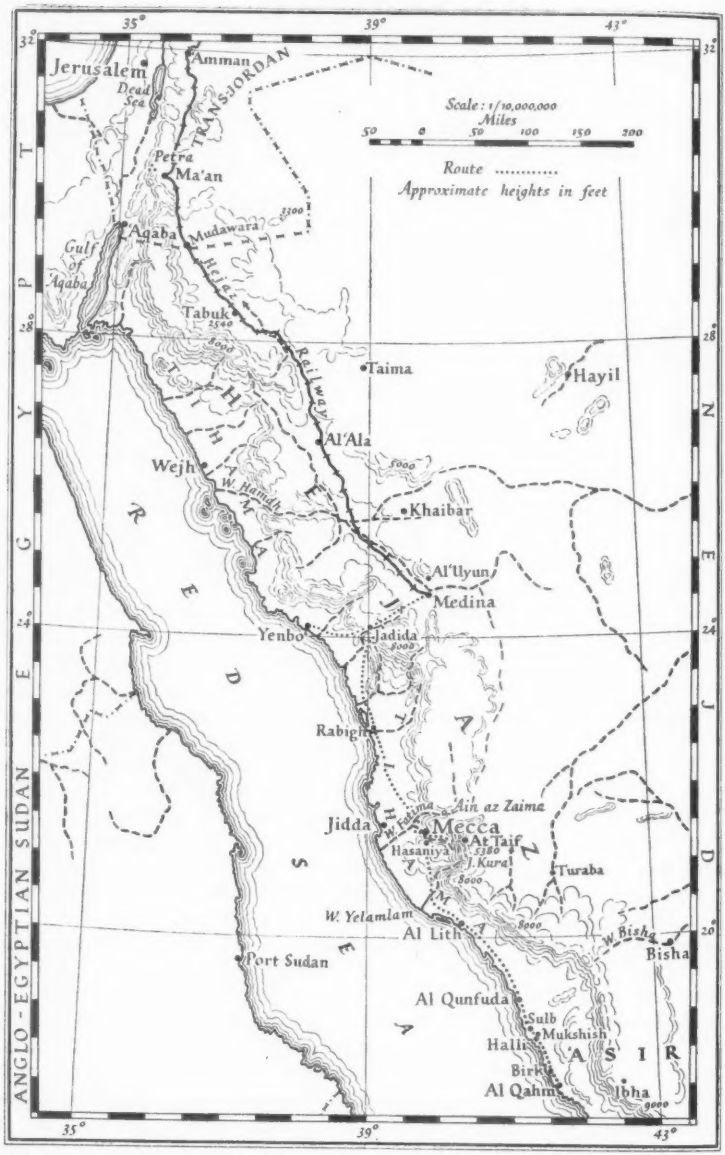
ELDON RUTTER

WE can often learn something about a place by studying the etymology of its name. The word "hejāz" is derived from the Arabic root حجز (hajaza), which means "to separate" or "to divide." Al Hejaz means what the Americans call the Divide, that is to say, the watershed. The Arab geographers do, in fact, limit the application of the name Al Hejaz to the mountain range which runs down the western side of Arabia. It is so called because it divides the upland plain of Nejd from the low-lying coastal plain called Tihama. In course of time however the name came to be applied to the Divide, plus the Tihama or coastal plain, and also a narrow strip of the Nejd plateau. It is probable that the Turks were the first to use the name in this sense. After they assumed the overlordship of the sacred cities, Mecca and Medina, the whole of the vilayet or province, from the Red Sea to the Nejd border, became known as Al Hejaz.

The position of the eastern and southern boundaries of this province has varied considerably. At times the oases of Taima and Khaibar, and even of Tabuk and Al 'Ala, have been over-run by the Badawin. At other times these places have been strongly held by the Turks. In the south the boundary has sometimes been pushed as far as the line Al Lith—At Taif by the warlike mountaineers of 'Asir, aided by the Badawin of the east. More usually the boundary has extended from Al Qunfuda to Turaba. Some of the Sharifs of Mecca however have managed to hold the line Halli—Bisha as their southern boundary. The latest of these energetic Sharifs was Husein, who became the first King of the Hejaz.

In the wolfish struggle for power which constantly goes on in Arabia, political boundaries are continually changing. In 1924, when Ibn Sa'ud sent his Wahhabis against At Taif, the southern boundary of King Husein's territory included Halli, but did not include either Bisha or Turaba. These two places had passed into the hands of Ibn Sa'ud some years before.

As to the northern boundary, there was some dispute after the War. When Ibn Sa'ud took Mecca, we, the British, occupied Al 'Aqaba and Ma'an on behalf of the protected State of Trans-Jordan. A considerable outcry was made



Sketch-map of the Hejaz showing Mr. Rutter's route to Mecca and Medina

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over this in Egypt and Syria, but Ibn Sa'ud himself does not appear to have made any very serious protest about it. It is not easy to uphold the hypothesis that Al 'Aqaba and Ma'an are Hejaz towns. They are separated more widely from the nearest human settlements of the Hejaz and Egypt than from those of Palestine and Trans-Jordan. The Hejaz Railway passes through Ma'an, but so also does it pass through 'Amman the capital city of Trans-Jordan. If Petra belongs to Trans-Jordan, then so does Ma'an, and with Ma'an goes its port Al 'Aqaba. We read in the Second Book of Kings that Elath, on the site of which Al 'Aqaba now stands, was built by the Jewish king Azariah. Subsequently, Rezin, King of Syria, took it from the Jews. Both Elath and the neighbouring port of Ezion-Geber were always held by the ruler of Palestine or Syria. The cities of the Hejaz, Mecca and Medina, have their own ports, namely Jidda and Yenbo' respectively.

Actually Al 'Aqaba and Ma'an have been left out and the northern boundary runs east from the Gulf of 'Aqaba south of the town, across the railway south of Mudawara station, to the 38th meridian at lat. 29° 30′ N. From that point the eastern boundary runs down to Bisha, avoiding Taima, but taking in Khaibar and Turaba. The modern province of Al Hejaz, then, is bounded on the north by the State of Trans-Jordan and the Gulf of 'Aqaba; on the west by the Red Sea; on the south by the principality of 'Asir; and on the east by Nejd. Roughly speaking, the shape of the country is that of a parallelogram, about 800 miles long by 150 miles wide. This great tract of territory is almost wholly a wilderness. From the Gulf of 'Aqaba to Wadi Bisha, from the Red Sea to the Nejd border, the country is an arid desert. There are a few small oases in it, but considered in relation to the size of the country they are insignificant.

To the east of the mountain range lies the elevated plateau of Nejd, raised about 3000 feet above sea-level in the northern districts, and 6000 feet in the south. This plateau slopes gradually in a north-easterly direction right across Nejd, until it finally merges in the Mesopotamian plain. A traveller approaching the Hejaz from the east would see a line of hills in front of him, most of which would appear to be less than 1000 feet high. But, on coming to the edge of the plateau, he would find that they are the crests of mountains springing from the Tihama plain, several thousand feet below. At some points the mountain crests rise to 8000 feet above sea-level. One of these is Jabal Kura, between Mecca and At Taif. In general, the farther south we go the higher the mountains become, until at the south-western corner of the Arabian Peninsula there are peaks of more than 10,000 feet.

When we turn to consider the geological formation of the Hejaz, we find that the coastal plain consists of sandstone flats. Considerable masses of drift-sand lie on some parts of this plain. In other parts it is strewn with flints, the limestone matrix of which has long since been denuded into powder and carried away. Other districts are covered with rounded blocks and pebbles of basalt. The elevated plateau on the eastern side of the mountain range is also mainly composed of sandstone, but here there is a superimposed layer of limestone in some districts, and also several extensive beds of lava. The central mountain range consists of granite, basalt, and syenite.

It would seem that the Central Arabian steppe of sedimentary rocks once

extended right across the Peninsula to the shores of the Red Sea, or beyond. Subterranean disturbances having forced up the mass of plutonic rocks which constitutes the mountain range, that part of the steppe which lay to westward of it was slowly worn down to sea-level.

In the whole of Arabia there is no perennial river, though large streams flow sometimes for days together, when there has been a heavy fall of rain. The largest wadi or watercourse in the Hejaz is the Wadi Hamdh. This is said to rise somewhere in the desert, about 100 miles to the east of Medina. It first takes a northerly course, and then turns south and passes close to Medina. From there it goes north-westward and finally reaches the sea about 30 miles south of Wejh. It is certainly 500 miles in length, and is possibly much longer, for I was told by an Arab in Mecca that it really rises near At Taif.

There are several other considerable wadis in the country. The most important of these is the Wadi Fatima. This rises about halfway between Mecca and Medina, and reaches the sea south of Jidda. It contains the most fertile oasis of the coastal plain. Another large wadi is that called Yelamlam, which rises in the western slopes of Jabal Kura, and extends to a point north of Al Lith. The Wadi Hamdh is remarkable in that it rises on the eastern side of the mountain range, and finds its way through to the western side. The majority of those wadis which rise on the eastern side of the range lose themselves in the sand, though some of them probably flow on subterraneously to the Persian Gulf.

The rains fall in November and December in the season of the monsoon winds, but north of Medina the rainfall is very scanty. In the new year many of the stony valleys and plains of the Hejaz are covered with a thin growth of young plants and grasses. This delicate film of green gives an unbelievable beauty to that grim country. It survives only a few weeks however, and then the burning Arabian sun withers it up. Very few plants can survive the summer heat on the coastal plain. For this reason the Hejaz is not a good country for rearing camels. The chief shrub is the thorny acacia, and besides this there are several sorts of tough and wiry grass which are eaten by the camels.

In the oases of the coastal plain dates and bananas are grown, besides tomatoes, onions, leeks, spinach, vegetable marrow, aubergine, bamia, and also melons and lucerne. In the upland oases there are grape-vines, rose trees, fig, pomegranate, quince, and apricot, and also wheat and barley.

The population of the Hejaz is probably less than a million souls. The people are divided into two classes: الحضر townsmen and البدو Badawin. The inhabitants of the two principal cities, Mecca and Medina, are nearly all employed in the pilgrim traffic, as guides, lodging-house keepers, merchants, and water-carriers. The townsman class also embraces the peasants in the oases, and the merchants and fishermen in the coastal villages.

The Badawin are camel breeders who live in tents. They spend their whole lives in wandering from place to place, searching in the desert for pasturage and water for their herds of camels. They live all their lives in semi-starvation. A satisfying meal, a few drops of bitter coffee, or a pipeful of coarse tobacco, are luxuries to them. They are divided into tribes, and each tribe has its enemies among the other tribes. Peace is not a popular institution among them, as it is opposed to the national sport, which consists of making raids on hostile tribes.

The largest tribe in the Hejaz is the Bani Harb. Their encampments may be found in most parts of the Hejaz and in Western Nejd, but the country lying between Mecca and Medina is their particular preserve. In the Northern Hejaz the chief tribes are the Huwaitat, Bani 'Atiya, Wald 'Ali, and Juhaina; in the south the 'Ataiba, Hudhail, and Quraish.

There were many Jews in the Hejaz at one time. The Arab historians tell us that Moses, when he was advancing into the Promised Land, sent an expedition into the Hejaz, which was then inhabited by the Amalekites. They formed colonies at Yathrib, which is now known as Medina, and at Khaibar. These places became cities of refuge for the Jews, and as late as the reign of the Emperor Hadrian many fled to them to escape the general massacre which followed the Jewish revolt. On the rise of the power of Islam however the Jews were driven out of the Hejaz. Some fled north to Palestine, others south to the Yemen. In the latter country there are still many thousands of them.

The Hejaz is the holy land of Islam. The Muslim, of whatever race he may be, is commanded in the Quran to make his pilgrimage to Mecca before he dies. Every year during the past thirteen centuries about 200,000 pilgrims have gathered there at the Pilgrimage season. The lodging and provisioning of such a multitude is obviously no small matter. To deal with it a large town grew up in the barren valley where the rites take place. Mecca is now a city with a permanent population of more than 100,000 people. A railway joining Medina with Damascus was built by the Turks, with the objects of making the Pilgrimage easier and of bringing this important Arabian province into closer touch with the centre of government at Constantinople. It was intended to extend the line to Mecca and Jidda, but it never got any farther than Medina. It was opened in 1908, and worked successfully until about five years ago. It is still in use between Damascus and Ma'an, but that part which is in the Hejaz, 500 miles in length, has not been used since Ibn Sa'ud conquered the country. The track has been torn up in several places, and the stations are in ruins. The only exports of the Hejaz are a small quantity of pearl-shell from some of the coastal villages, and a few hides from the chief cities.

No form of art or artistic craft is practised in the Hejaz, if we except the work of one or two silversmiths and wood-carvers in Mecca. Pictorial art is unlawful under the Islamic Code, and so also is music. As for literature, now and then some Meccan or Medinan adds a book or pamphlet to the cumbersome mass of Islamic theological writings, but nothing more. For some years a newspaper has been published in Mecca, but it has always been the official organ of the Ruler.

It is well known that, with the exception of Jidda, the whole of the Hejaz is a forbidden country to unbelievers. In Jidda the non-Muslims are under the protection of the Ruler. If at any time his countenance were to be withdrawn from them, there would doubtless be a general massacre of unbelievers as soon as it became known.

With the arrival in the Hejaz of the victorious Wahhabis, a change has been introduced into the system of its government. Under the Turks, the real ruler of the Hejaz was the Sharif of Mecca. Turkish influence was dominant only in foreign affairs. Instead of government largely conducted by bribery, the Hejaz now enjoys government in strict accord with the Islamic Code. Instead of every

official creating a private hoard for himself, there is no hoarding done at all. Even Ibn Sa'ud, who is, to all intents and purposes, the absolute sovereign ruler of the country, has to pursue a policy which does not permit him to create a hoard of wealth. The terror of his name made the country safe to travel in and to live in as soon as he had conquered it, but fear of him and his Wahhabis will not alone keep it safe, unless he can keep a force of those grim warriors in the Hejaz. But he cannot do that because of the mutual hatred of the Hejaz and Wahhabi Badawin. In order to ensure peace being kept, he is obliged to distribute large doles to the shaikhs of the tribes. The Turks had to do the same. It is a toll which the Badawin have levied from time immemorial.

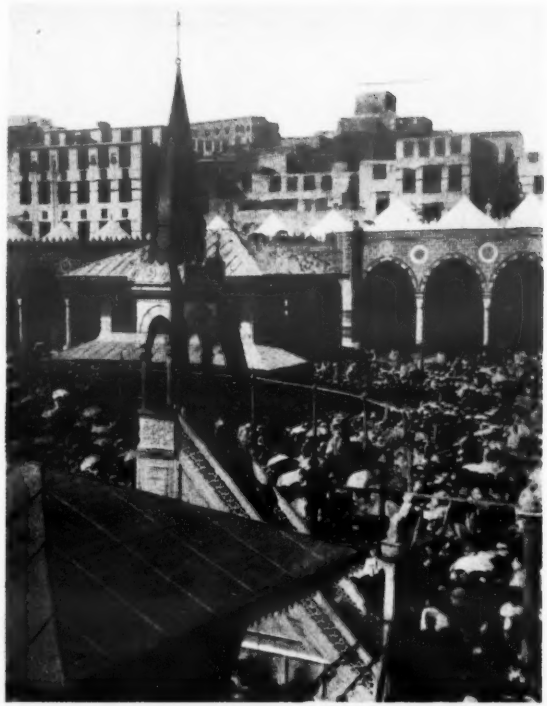
Now Ibn Sa'ud's power is really founded, not on the piety of the Arabs, but on their cupidity. About two hundred years ago the family of Sa'ud were offered a means of quickly obtaining a wide dominion. It was a plan for a religious revival, a plan which would have made no appeal whatsoever to the desert Arabs, had it not been that, by uniting their factious divisions, it offered them a prospect of loot on a very large scale.

The first Wahhabis duly enjoyed their power and their loot, until they were crushed by a disciplined army from Egypt. In the present century a second Wahhabi revival has been launched by Ibn Sa'ud. That able man has been exceedingly successful, firstly, because of his striking personal qualities of statesmanship and leadership, and secondly, because he was able to hold out to his followers the promise of much loot. Starting out from Kuwait about thirty years ago, a prince without so much as a square foot of territory under his dominion, he offered his followers the loot of all Southern Nejd, then of its northern provinces, and finally of the most important of all the countries of Arabia—the Hejaz.

Arab statecraft consists largely of buying the allegiance of your enemies. Only when the purse fails, or when the enemy is considered too weak to be very dangerous, is the sword brought into use. But Ibn Sa'ud, in the opinion of his followers, has secured the allegiance of far too many of his enemies. His followers lose not only the presents which he gives to those others, but they also lose the loot which they might have taken from them had they been allowed to attack them. The greater part of Ibn Sa'ud's revenue is given away in these presents to the tribes. When the Turks held the Hejaz, large sums of money were sent from Constantinople for this purpose, but at present the country has only its own slender resources.

Another large item of expenditure, which the Hejaz never had to bear in the days of the Turks or of King Husein, is for motor cars, wireless equipment, arms and military gear and ammunition, and even aeroplanes. The funds for meeting all these liabilities come from the taxes levied on pilgrims to the Hejaz. Each pilgrim pays about £1 on landing in the country, and there are high taxes on every camel or motor car which carries pilgrims or their baggage. For instance, when I was in the Hejaz the tax on every camel carrying pilgrims from Mecca to Medina was £4.

The Hejaz therefore supplies Ibn Sa'ud with the funds which enable him to buy or enforce the obedience of a fanatical and turbulent horde of warriors, who would otherwise lose no time about murdering the weaker communities in his dominions, and looting their possessions.



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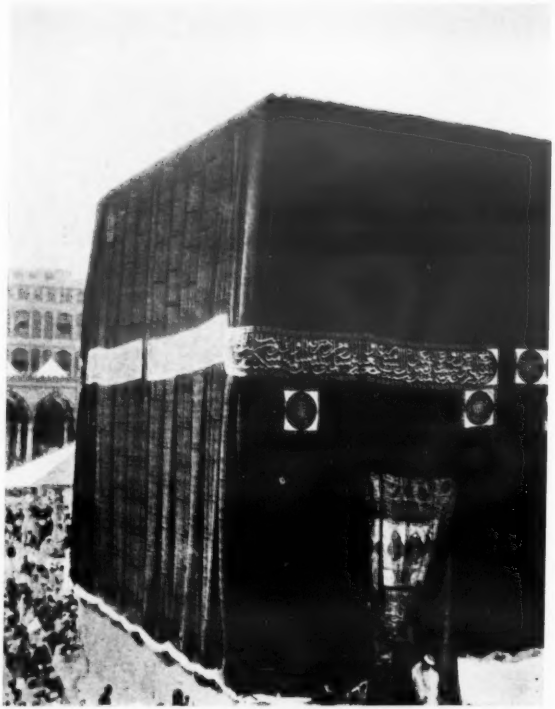
The marble pulpit in the Great Mosque at Mecca



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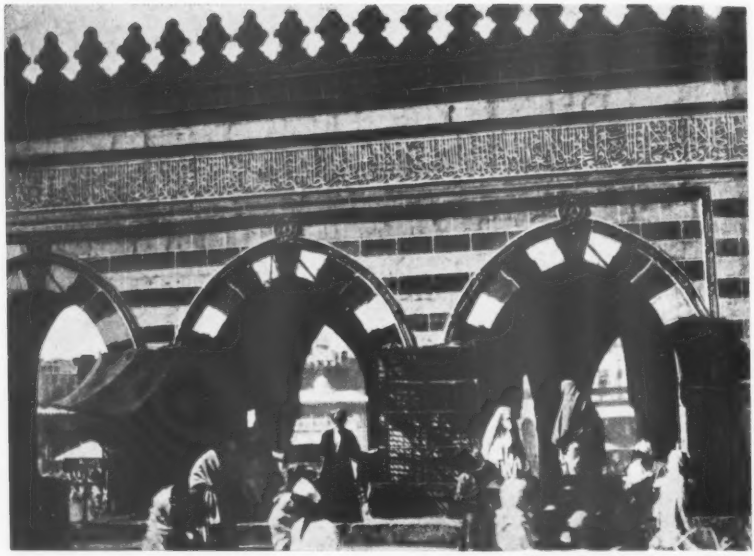
The House of Allah, with Keeper of the Key sitting on threshold of doorway



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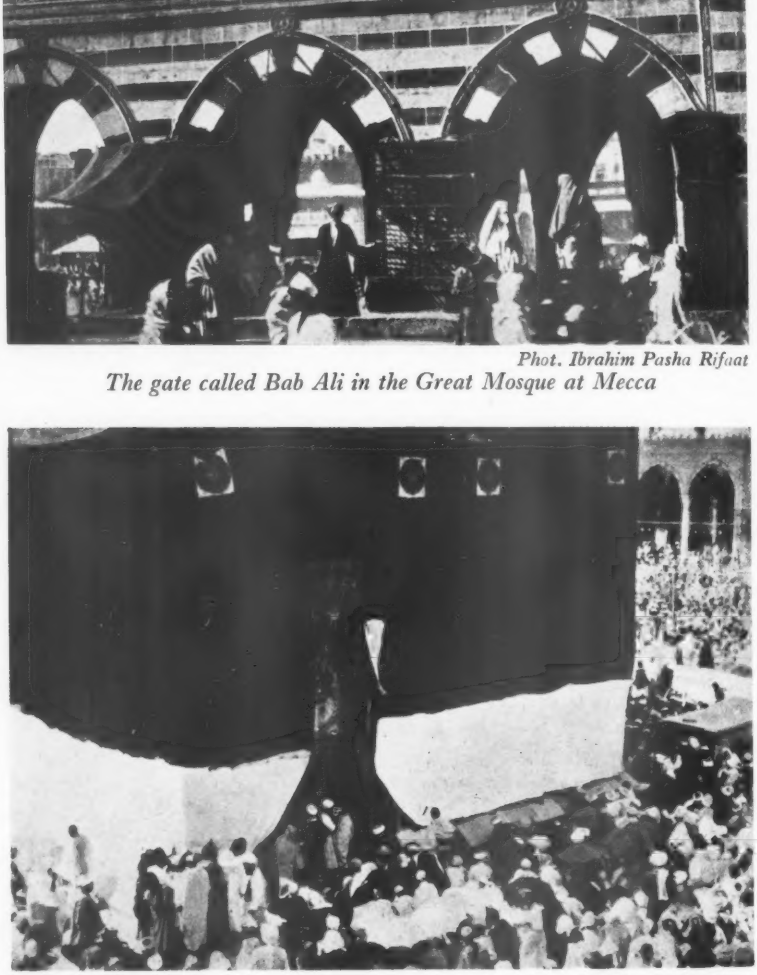
The gate called Bab Ali in the Great Mosque at Mecca



Phot. Ibrahim Pasha Rifaat

Pilgrims kissing the Black Stone at the corner of the House of Allah (left foreground of photograph)

The force which Ibn Sa'ud manipulated into placing him in his present position is located in Nejd, and, in spite of his doles, one of his greatest problems has been to keep that force under control. Up till the beginning of this year, large numbers of them had been in revolt against him, off and on, for several years. Among the forces which he used to crush this rebellion, were Badawin of the Harb tribe. Ibn Sa'ud thus employed inhabitants of the Hejaz to subdue the Wahhabis who had enabled him to conquer their own country a few years before.

So long as the Wahhabis remained loyal it seemed that Ibn Sa'ud's former capital, Ar Riyadh, might continue to be the real stronghold of his power. But it now seems likely that before long Mecca will usurp that position, especially if the King establishes a paid force of regular troops. It is in many ways an interesting speculation as to how far Ibn Sa'ud's adoption of Mecca as his political capital has led to the decline of Ar Riyadh as the stronghold of his military power. His personality commands very great influence wherever he happens to be, but at a distance it is not so potent.

Early in June 1925 I landed at a place called Al Qahm in the principality of 'Asir. I was travelling as a Muhammadan pilgrim on the way to Mecca. In company with some Moors and Abyssinians, I had crossed the Red Sea in a dhow from Massawa, in the Italian colony of Eritrea. It had taken the dhow eight days to cross the Red Sea, a distance of about 200 miles. This works out at 25 miles a day, and is about the rate of progress made on land by a camel-caravan. At this time the internal condition of Arabia was normal, that is to say, there was fighting going on. Ibn Sa'ud had driven King Husein and his followers out of Mecca, and was besieging them in Jidda and Medina. The coast of the Hejaz was under blockade, the object being to prevent supplies from reaching Ibn Sa'ud. The blockading force could scarcely be described as imposing. It consisted of a single steam launch armed with a small gun. But it was sufficient to deter most of the captains of dhows from risking their craft in Hejaz waters. My companions and I had experienced some difficulty in getting a passage, but at last we managed to get on a dhow which was taking a cargo of rice and sugar to Al Lith.

Having landed at Al Qahm, we hired camels to take us to the Hejaz frontier at Halli. We reached that place in two days, being joined on the way by several Indians and Meccans. Halli is an exceedingly dirty village of rush huts, with a mosque built of mud. Some millet is grown on the plain round about the village, and there is a small grove of date-palms at a place called Mukshish, about a mile away. The inhabitants also procure slaves from the Yemen, whom they sell to the merchants of Mecca.

After resting a few hours at Halli we mounted and moved on. We had a journey of two weeks ahead of us before we should hear the call to prayer being chanted from the minarets of the Great Mosque at Mecca. That journey was an instructive experience in Oriental manners and ways of thought. At one village the travellers argued with the camel drivers as to whether they should start before or after sunset. The camel drivers said, "At sunset we will stop for you to alight and pray. Let us start now." One of the Meccans said, "O Shaikh, it is better to pray here before we start, and then march straight on."

One of the Indians said, "Couch this camel, O my uncle, so that I may spread my bedding on his back." The camel driver said, "Let you spread with him standing, for now we start." The Meccan said, "Good! Then we will start." Another Meccan said, "No, O Shaikh, let it be after the sunset prayer." One of the Indians then began to spread his blanket on a camel. Finally, at about five minutes before sunset, we all mounted and moved off. When we had gone a few yards out on the plain, one of the Meccans began to chant the call to prayer. It was sunset. We all stopped and dismounted; and here, within a stone's throw of our starting-place, we formed in a row to repeat the sunset prayer.

One afternoon as we marched across a hot sandy plain close to the seashore I saw a river ahead of us. On its banks were lines of trees, and their forms were reflected in the water. Then I saw the stone houses of a town, and among them were the forms of men, but I could not see whether these were moving about, or whether they stood to look at our passing caravan. The strange thing was that although we continually advanced, we never seemed to get any nearer. At last it dawned upon me that the whole spectacle was a mirage. The river and the town and the trees were nothing but waves of refracted light over the plain. In my experience the mirage is not a common phenomenon. I have never seen it in sand-dune country. This plain was inundated by the sea at certain seasons, and when the water evaporated a crystalline deposit of salt was left. It was this, I think, that made the illusion so vivid.

As we advanced northward the mountains receded on our right hand, leaving a broad sandstone plain between themselves and the sea. In places there were low dunes of drifted sand lying on the plain, and it was occasionally broken by shallow dry watercourses winding their way from the foothills to the sea. At sunset on the fourth day we came in sight of the walls of Al Qunfuda. This is one of the few places at which ships can approach close to the shores of the Hejaz. A chain of rocks and sandbanks stretches nearly the whole length of the coast.

As we rode through a gap in the wall my attention was attracted to two tall Badawin armed with rifles, who stood on guard there. There was something unusual in their appearance. Instead of the shifty look of the average Badawin who finds himself among the walls of a town, they wore a stern intolerant expression. A white turban cloth was wound about their heads over the head-cloth. By this I knew that they were Wahhabis. As we rode into the town one of them turned and walked beside our camels. He was evidently keeping us under observation. A feeling of uncertainty came over me, but the only thing to do was to go on with the others. We reached the Custom House, and it then transpired that the object of our guard was to see that the camels were not unloaded until their burdens had been inspected by the Wahhabi officials. While this was being done, one of my travelling companions lit a cigarette. Suddenly a stern voice in the darkness behind us said, "Stop smoking!" My companion hastily dropped his cigarette, and we turned to see who had spoken. It was a youth dressed in the Wahhabi manner, and evidently one in authority. He asked us where we came from. We told him, "From Halli," and he said, "It is upon you not to drink smoke." Our guard said rude things about my companion, and would not return our parting salutation.

On the tenth day we came to Al Lith, another village of mud houses and rush

huts, and two days later we found ourselves in a maze of rock hills which lay scattered on the plain. This was an appalling country. The ground was strewn with black stones of all shapes and sizes. Around us rose basalt hills of the same deadly blackness. These, in their shapeless ugliness, appeared like uncouth masses and piles of dead cinders, while the ash-grey sand which covered the ground at their bases served to increase their appearance of great burnt-out fire-heaps. The sun which flamed down into the pits between these hills seemed to burn like the heat of a furnace. I soaked a turban-cloth in water and bound it about my head, and rode on, vainly looking ahead for some sign of shade in the burning wilderness.

At last we came to a dry watercourse called the Wadi Yelamlam. We were now about to enter the limits of the sanctuary of Mecca. Accordingly, we were obliged to discard our ordinary clothes, and put on the pilgrim dress known as *al ihram*. This consists of two pieces of cotton material without any seam in them. I used two Turkish towels. Having performed the ceremonial ablutions, we put on the *ihram*—one towel secured round the waist like a skirt, and the other thrown over the shoulders. I continued to wear my sandals, but nothing is allowed to be worn on the head. Having made this change, we offered up certain prayers, ate our evening meal, and then mounted and moved off again.

Two days later our camels were still crawling through the interminable maze of rock. As darkness fell the hills seemed to merge in the blackness of the moonless night. The stars glittered like jewels. In Arabia it always seemed to me that the stars were nearer and more real than the ground which glimmered and faded beneath the feet of my camel. Occasionally the pilgrims cried, "At Thy command, O Allah, here am I." We moved onward in the silent night. I thought the Arabs must have lost their way. There could not be a great city in the midst of this desolation. Suddenly a light appeared ahead. Then the tall forms of shuttered houses became detached from the darkness. We were passing into a narrow unpaved street, I could see the houses on either side. I was in Mecca. I had now passed the forbidden limits, and entered the streets of a city which may be looked upon by none but true believers. A single false move now might be the cause of my being numbered among those who, having got into Mecca, were destined never to get out again.

The caravan went slowly down the dark lane, and halted in the principal market-place of the city. I dismounted, my saddle-bags were taken off the camel, and the caravan passed on in the darkness. With the help of a man whom I found sleeping in the street, I discovered the house of a pilgrim guide named 'Abdurrahman. I had not been in his house many minutes when we heard the Call to Prayer being chanted from the seven minarets of the Great Mosque. Accompanied by my host, I made my way to one of the gates of the Mosque. We stepped across the threshold, and I stood at last in the Great Mosque of Mecca. Through a forest of stone columns I saw a great quadrangle nearly 5 acres in extent. In the centre stood a cube-shaped building, about 50 feet high. This was the House of Allah. It was covered by a black cloth. Over the crests of the eastern hills the faint light of dawn was beginning to appear in the sky.

"Look!" said 'Abdurrahman, "The sacred House of Allah." I walked

forward to the edge of the cloisters, and looked out across the court of the Mosque towards the black-draped cube. Reared up in the centre of the open quadrangle, it seemed aloof and mysterious. Round and round its base the pilgrims hurried eagerly, uttering their supplication, "O Allah, grant us in the world good, and in the hereafter good, and save us from the punishment of fire."

During the next few days I performed the rites of the Muhammadan Pilgrimage. The first of these take place in Mecca itself, and the final rites are performed at a place called 'Arafa, about six hours' camel journey to the eastward. After this I remained in Mecca for nine months, in order to make a study of the place and the people.

An idol-house, at which the pagan Arabs used to worship, existed in the valley of Mecca before the time of Muhammad. The Prophet caused the idols

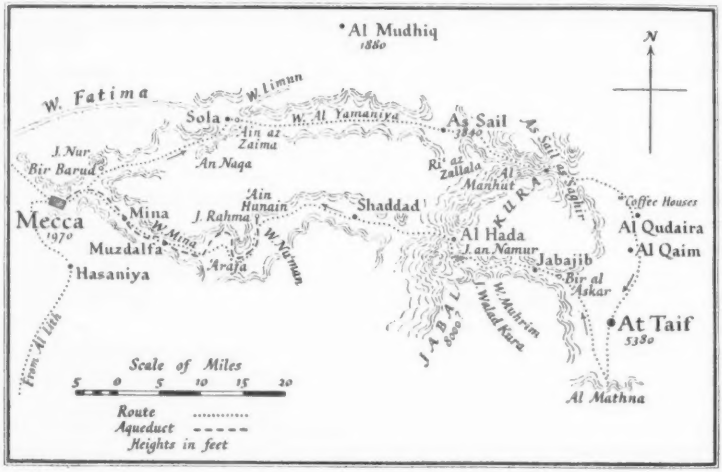


Diagram showing Mr. Rutter's route from Mecca to At Taif

to be destroyed, and consecrated the temple to the service of Allah. At that time Mecca was a small village, but after the institution of the Muhammadan Pilgrimage the necessity for housing many thousands of pilgrims soon caused a large town to grow up. Mecca lies in a basin about 2 miles long and half a mile wide, almost entirely surrounded by barren mountains. A dry watercourse runs through the valley, and part of this forms the main street of the town. In the rainy season it is sometimes in flood for several hours at a time. The chief water supply for the inhabitants is brought by means of an aqueduct from a spring called 'Ain Hunain, about 25 miles to the east of the city. Vegetables and fruit are procured from the surrounding oases, the nearest of which is about ten hours' camel journey away; camels, sheep, and goats are supplied to the butchers by the Badawin of the desert, and other supplies come by sea to Jidda.

When I had been about six months in Mecca I made arrangements to visit

Phot. Ibrahim Pasha Rifaat

The green dome covering the Prophet's tomb at Medina

Phot. Ibrahim Pasha Rifaat

The gate called Bab es Salaam in the Mosque at Medina

the upland town of At Taif, which is the summer resort of the Meccans. With three Badawin, I left Mecca at sunset, following the eastern road to the oasis of 'Ain az Zaima, which we reached at dawn. 'Ain az Zaima is the ancient 'Ukaz. Before the time of Muhammad a great concourse of Arabs used to assemble at 'Ukaz every year. The merchants bartered their merchandise for livestock with the Badawin. The young men rode in camel and horse races, and took part in warlike contests. The poets recited their verses. In fact, the scene bore a primitive resemblance to the Olympic Festival of the Greeks. The oasis is now of little importance, as one of the principal springs has dried up.

Pursuing our way up a great watercourse called Al Yamaniya, we came on the third day to the walled town of At Taif. We had been climbing all the way, for the town stands on the edge of the upland plateau at an elevation of over 5000 feet above sea-level. The charm of At Taif is in the comparative coolness of its climate and in its orchards of fruit trees and fields of wheat, barley, and lucerne. At the time of my visit, in February, the peach and almond trees were in blossom, and by contrast with the sterility of the surrounding desert the orchards were a heavenly sight.

On our way back to Mecca I had an opportunity of seeing how completely the mountain range of the Hejaz cuts off the coastal plain from the upland plateau. Standing on the summit of Jabal Kura I looked down upon the coastal plain, over 6000 feet below, while immediately behind me the Nejd plateau stretched away to the east. We descended the mountain, and came the next day to the plain of 'Arafa, where the rites of the Pilgrimage take place, and from there passed down a narrow valley to Mecca.

I had spent the greater part of a year in Mecca, and by this time I was beginning to feel the effects of the climate and the hardships of the pilgrim's life. I had had a short attack of fever during which I had, in delirious imagination, been the horrified spectator of my own burial in the grim graveyard. I decided that the time had come for me to set out for Medina. This city lies on the upland plateau, about 250 miles north of Mecca, and is situated in a large oasis. Travelling slowly with a party of Egyptian pilgrims, through a plain covered in places with drift-sand and sometimes with flints, I reached the city in twelve days' camel march. We went in through the western gate called Bab al 'Anbariya, and as we came to a gap in the inner wall, there burst upon our view the beautiful sight of a lofty Green Dome, surrounded by the five minarets of the Great Mosque. The Prophet's tomb lies under this dome. I found a guide to conduct me in the rites of visiting the tomb, and in his house I lived for about two months. The rites take only half an hour, and they are not obligatory. They do not form any part of the religion of Islam, but most of the Muslims who can afford the expense visit Medina out of veneration for the Prophet.

The days of my sojourn in Arabia were now drawing to a close. In the heat of the day I was in a sort of daze, and I began to feel that even now I might not get out of the country alive. I arranged to travel to Yenbo' on the coast in the company of two merchants. We set out on 18 June 1926, crossed the mountain range, and descending into the Tihama plain, reached the coast in five days. On the following day a steamer from Suez came into the harbour, and I boarded her. I intended to travel in her as far as Port Sudan, and to go from there to Khartoum and Cairo. I went to my cabin and shaved off my beard.

Then I threw off my Arab clothes and put on some European things supplied by the steward. After this I had lunch, using a knife and fork for the first time for more than a year. Presently I went to the rail to take a last look at Arabia. Beyond the blue waters lay the silent yellow plain, and far away to eastward the mountain peaks were fading slowly. The steamer had swung round the sandy islet which protects the harbour, and was heading for the open sea.

DISCUSSION

Before the paper the PRESIDENT (Admiral Sir WILLIAM GOODENOUGH) said: Some little time ago I received a letter from one of our Honorary Members, General Smuts, in which he wrote, "And what of Asia, that strange, mysterious country from which came all human upheavals?" That was true of the great philosophers, the great destroyers, the great founders of religion. To-night we are going to hear from Mr. Eldon Rutter the fourth Asia Lecture, in which he will give an account of his travels in the Hejaz country, which is still very little known to most of us. Mr. Rutter is one of the few Englishmen who have been to Mecca. Those who have read his book, 'The Holy Cities of Arabia,' will have gone one step farther towards the comprehension of the East. It might seem that I have said little of geography, but believing as we do that geography is the road which leads to every kind of knowledge we await with great interest Mr. Rutter's lecture, which I now ask him to deliver.

Mr. Eldon Rutter then delivered the lecture printed above, and a discussion followed.

The PRESIDENT: So unknown is the country about which we have heard that there is no one upon whom I can call to follow the lecturer in the usual way, but I am sure we should like to hear any one who wishes to ask any question.

Mr. BERNARD FREEMAN asked the lecturer whether the water of Zemzem is alkaline, and whether the tribe of Quraish is still in existence.

Mr. RUTTER replied that the water is alkaline, it comes up warm from the well, and is put into clay jars. There are a number of the tribe of Quraish in the town of Al Lith, which is the last town he touched before reaching Mecca. They were engaged also in the pilgrim traffic on the Jidda road, and were well-grown and fine physically.

A FELLOW: Can Mr. Rutter explain why the Yemen in the south has so much greater rainfall and therefore so much greater fertility than the Hejaz? Can he account for it geographically or give any other reason why there should be this apparently great distinction between the Hejaz and the Yemen? At the same time, I must say I am very grateful to him for the descriptive account he has given of the Hejaz and the wonderful photographs he has exhibited.

Mr. ELDON RUTTER: I think the explanation is to be found in the fact that, in November and December, the monsoon winds drive heavy masses of clouds against the high mountains of the Yemen. The bulk of the rain falls on these mountains, and very little moisture is carried farther north, to the Hejaz.

Mr. HINKS: Mr. Rutter referred to the Black Stone; and in the Meteorite Gallery at the Natural History Museum one sees meteorites of three kinds: pure metal, purely stone, and also that strange type, the plum pudding of iron in stone or stone in iron. I do not know whether it is possible for Mr. Rutter to tell us if the stone he saw is a meteorite of the metallic or stone variety.

Mr. ELDON RUTTER: It is dark brown in colour, which might lead to the conclusion that it has in it a considerable amount of iron, and there are crystals of a lighter reddish colour in it.

Lord EDWARD GLEICHEN: I should be glad to know how the inhabitants of Mecca get their water supply.

Mr. ELDON RUTTER: There is a very good water supply drawn from a spring called 'Ain Hunain, about 25 miles east of Mecca. The water is stored in stone tanks, of which I think there are some eight or ten in different parts of the city. From these the inhabitants come and get their water, which is excellent and perfectly clear. The springs of 'Ain Hunain are connected with the tanks in Mecca by an aqueduct, which was constructed with the aid of funds supplied by Zubaida, the wife of Harun ar Rashid.

A FELLOW: May I ask the lecturer how he managed to take those extraordinarily good photographs in a Muhammadan country without his identity being discovered?

Mr. ELDON RUTTER: I took very few myself, in fact, most of the photographs were lent to me by an Egyptian who took them several years ago when the Turks ruled the Hejaz. At that time it was comparatively easy to photograph. Since the Wahabis have taken the country it is dangerous to be seen taking photographs. However, I was able to carry my camera obscured under my cloak, and then when the coast was clear to uncover the lens. Most of my attempts produced poor results, by reason of the difficulties of operating the camera without being observed.

The PRESIDENT: I cannot help thinking how splendid it would have been if those we have heard lecture in another hall could have taken part in this discussion. Some we cannot hear again: Gertrude Bell and Gilbert Clayton, and Mr. Philby is away from this country. May I, Mr. Rutter, on behalf of the Society, offer to you not only our congratulations, but our sincere thanks for a most interesting evening. You are one of the few people who have gone into that country and have come back to show us photographs and describe your journey. We have had a great treat and we thank you very much, not only for the lecture but for the replies you have given to the various interesting questions which have been asked.

THE ISOKO COUNTRY, SOUTHERN NIGERIA: *A paper read at the Evening Meeting of the Society on 1 December 1930, by*

JOHN W. HUBBARD

THE economic and social development of the Southern Provinces of Nigeria, and problems connected therewith, are at the present time receiving a considerable amount of attention. The economic wealth of the country is being exploited; roads and railways are being built; and the motor car and motor cycle are common sights. In addition, the education of the inhabitants is being undertaken both by Government and by Missionary societies.

There are still however many districts where native life proceeds in the ancient way and where, as yet, the influence of Western civilization has hardly been felt. These lie off the beaten track, in inaccessible parts of the country, far away from the big centres of trade and industry.

I am a missionary of the Church Missionary Society, and my work lies in one of these remote districts. It is almost unknown to Europeans, and presents many strange features. It has never been properly surveyed; in fact, the only map of it that exists is a sketch which I made, with the help of a compass and cyclometer on a bicycle.

This tract of country is situated in the Equatorial Forest Region of the Southern Provinces; it is inhabited by the Isoko and Erakwa tribes and known as the Isoko Country. Its area is about 800 or 900 square miles, and it lies immediately to the west of the Niger where it divides into the Forcados and Nun rivers. It includes within itself part of the Ase Sub-District, Warri Province, and is bounded on the east and south by the Niger and Forcados rivers, and on the north by an irregular line joining the towns of Abo, Ashaka and Abbi, though the towns themselves lie outside the area. Its western boundary is not well defined, but it may be taken as being about 25 miles west of the Ase Creek. The lower 30 miles of this creek is the principal waterway of the district, which it divides into two unequal parts, the smaller of which lies between the creek and the Niger River.

The district lies about 60 miles east of Warri, within reach of all the river traffic, and yet it remains unknown and undeveloped. One reason for this is that it lies in a backwater. The rivers Niger and Forcados, which join Abo and Warri, describe a semicircle facing south; this semicircle includes the Isoko Country in its eastern half. All roads connecting Warri with towns and trade centres farther inland lie to the north of this semicircle, and all waterways, except the unimportant Ase Creek, lie to the south and east.

The Niger River, its creeks and tributaries, profoundly affect the geography of the country and the lives of its inhabitants. Being part of the delta, the whole district owes its existence to the river; under the surface soil nothing but sand is to be found, although in certain places, at a depth of 14 feet or more, there is a bed of small gravel of the size used for concrete. Stones and rock of any description are entirely absent. The country is, of course, very flat, hills and gradients, beyond the smallest, being unknown.

It is well known that the waters of the Niger are subject to an annual rise and

fall, and that the times of high and low water vary in different parts of its course. This rise and fall affects the life of the districts through which the river flows to a greater or less degree according to circumstances. Thus, the country near Onitsha, being well above the level of the river, is but little affected. Similarly, the lower reaches of the delta near the coast are also little affected; because there the difference between high and low water-level is but small, the flood-water having spent its force in the numerous creeks and inlets of the delta.

The upper parts of the delta, which include the Isoko Country, are however greatly affected by the advent of the high water. Here the country is very low-lying, and has to bear the full brunt of the flood, as there are but few creeks to draw away the water. As a consequence most serious flooding occurs, and to such an extent is this the case that the whole aspect of the country is changed at that season.

The flood-water coming down the Niger reaches the Isoko Country at the end of May; its approach is announced by a quicker current in the river and creeks, extra muddiness, and the appearance of water plants brought down by the current. The water in all rivers and creeks continues to rise from June to October. At the beginning of November the flood is at its height; the river and its associated watercourses being at least 30 feet higher than in April and early May. About half the Isoko Country is laid under water from a depth of a few inches to many feet.

During November and December the floods rapidly diminish; all the water flowing outwards from the creeks and swamps, leaving a desolation of mud and wreckage behind it. By Christmas time the water has nearly reached its lowest level; but the fall still continues during the early months of the year, and towards the end of May the river is at its lowest.

The inward and outward flow of the water in the creeks is taken advantage of by the natives for trapping fish. A barrage constructed of poles, sticks, and brushwood is built across the creek, with a gap in the middle wide enough to allow a fair-sized canoe to pass—say 6 feet. The barrage is so constructed that all water has to pass through the gap, none, or only a little, can percolate through the barrage. The water thus flows like a mill-race through the gap. When it is desired to catch fish, several men will stand on the barrage on either side of the gap with a wickerwork cage of pyramidal shape whose base will just cover the gap in the barrage. This cage is lowered into the swiftly flowing water, an operation requiring great skill and care; the fish are swept into the cage, and unless they can swim against the current, there they stay till the cage is raised. The fish are thus filtered out of the water.

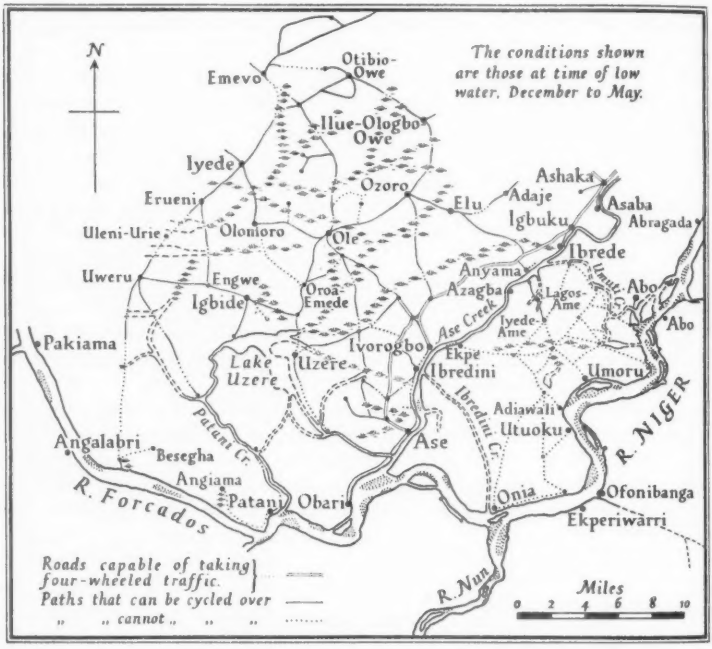
Another device for trapping fish is to place a quantity of brushwood in shallow water in some quiet spot and leave it entirely undisturbed for a few days. The fish then come and live in the brushwood, no doubt regarding it as a protection against aquatic enemies. When the fisherman thinks he has sufficient fish, he will carefully surround the brushwood with a big wickerwork screen, then step into the water and collect the fish.

During the time of low water there is an appreciable current in the Niger and Forcados, but most of the creeks in the Isoko Country are either dry or contain pools of stagnant water. Even the Ase Creek, whose width is about the same as that of the Severn about 8 miles below Gloucester, contains water

that is almost stagnant, and is difficult to navigate even with vessels drawing only a few inches of water.

A resident of the Isoko Country might be tempted to wish that the local rainy season coincided with the time of low water, and the dry season with the time of high water. There would then be ample rain to fill up the creeks and prevent them from getting stagnant; and the flood-water would conveniently come at a time when rain was scarce.

However, this is not so. The rainy season in the Isoko Country is the same as that in other parts of the West Coast. The rains commence in May and continue, gradually increasing in volume till November, when they finish



The Isoko Country, Southern Nigeria

fairly suddenly and the dry season begins. There is only one break in the rains and that is for about a fortnight in August, known locally as the "little dry"; this is however but a herald announcing heavier rains yet to come.

The arrangement could not be worse. The flood-water from the north arrives at the same time as the rains from the south, and both increase in intensity together. The result is that during the latter part of the wet season there is hardly a dry spot anywhere. The rains increase the height of the floods, and the areas that are not flooded are a mass of pools, mud, and quagmire.

It may well be understood what a profound difference the floods and rain make to the country. During the dry season all travelling is on foot or on

bicycle, along narrow paths through the "bush" and forest that cover the whole country. As the wet season advances and the floods increase, travelling on foot or bicycle becomes impracticable, except in certain restricted parts. A native canoe must now be used, or if this is unobtainable, the traveller, whether white or black, must be prepared to wade or even to swim for certain parts of his journey. He will realize too that he is now canoeing or swimming over paths on which but a few months previously he was walking or cycling.

Some of the villages get their names from their watery surroundings: for instance, Lagos-Ame (=Watery Lagos), Iyede-Ame (=Watery Iyede), Uleni-Urie (=Uleni of the Lake).

There are no roads in the European sense of the word except one. This connects Government Headquarters at Ase, and the trading station at Ivorogbo, with the town of Ashaka, lying 30 miles to the north. It is however no better than a wide earthen track, and is flooded in parts in the wet season. The absence of stone and rock forbids the making of proper roads.

The flooding is worst in the area lying between the Ase Creek and the Niger River; in the wet season it is almost entirely under water. Travelling in this district is difficult even in the dry season; it is thickly forested, and there are no paths worthy of the name. The traveller who ventures here will, after leaving his launch, climb the steep cliffs of the Ase Creek or Niger River, and follow a narrow trail through the forest. He will encounter many obstacles. There will be numerous swamps to be crossed, some of these may have tree trunks thrown at random over their deepest parts; others will not even have this primitive form of bridge. If the traveller is not negotiating swamps he will be scrambling over fallen trees or tree roots, and avoiding other obstacles such as creeping plants or the numberless holes in the trail, a fall into which would assuredly mean a sprained ankle.

Eventually, having walked in this way 4 or 5 miles from the creek or river, he will reach one of the many villages in that area, and will observe, perhaps with surprise, that every house is raised 2 or 3 feet above the road-level, being built on earth piled to that height. The reason for this would be made clear if he were to travel there in the height of the wet season. Then he would find that he would have to transfer from motor-launch on the Ase creek or the river, not to dry land, but to a canoe. The banks would now be marked not by the high cliffs of the dry season but merely by the edge of the forest. The canoe would then be paddled through the forest; the launch would be able to do this except for the difficulty of steering it through the forest. Reaching the same village it would now be seen to resemble an African Venice, and the floors of the huts being raised above the water-level would be reasonably dry inside.

The swamps are another curious feature of the country. Connected with the main river are many small creeks and inlets; these in certain places open out into lakes, and at others trail off into swamps. These appear to be creeks that have partly silted up with sand and earth, and on which, owing to the continual moisture and the warm steamy atmosphere, there grows in many places immensely thick vegetation. They are very low-lying and follow regular courses; where a path crosses them it either goes straight through, or may be carried on a small earth embankment, cut in various places by culverts, to

allow the passage of water. Where this cannot be done trestle bridges have to be used.

On the arrival of the wet season it is the swamps, lakes, and creeks connected with the main river that are the first to fill up with water, and from them the water gradually spreads over the higher ground. The high water every year destroys all culverts on paths crossing swamps, and also does serious damage to the embankments; indeed, all the paths that have been flooded suffer severely. Regularly therefore every December work has to be undertaken on the paths in order to make them fit for use during the coming dry season.

The annual rise and fall of the Niger dominates not only the geography of the country, but its climate, the lives of its inhabitants, and its future development.

The whole country is covered by forest and by that form of tropical vegetation known as "bush" in West Africa and "jungle" in India. The only parts that are not thus covered are the sites of villages, the paths, and areas which have been cleared for growing yam, cassava, and other crops. The forest contains many enormous trees, of which the Eroka is the most valuable. This yields a hard red timber, suitable for buildings and furniture, as it resists termites. The ironwood grows in the swamps, a valuable timber for building; it is termite-proof and so hard it cannot be worked with carpenters' tools. Besides exogenous trees, oil-palms, coconut, and wine-palms are abundant. Tropical fruits, such as bananas, plantains, paw-paws, and pineapple, are fairly common, but not of good quality, owing to the sandy soil. Swamps produce flowers and waterlilies, which serve to break the monotony of the endless bush and forest.

Of large animals only the leopard and the water buffalo, known as the "bush-cow," are at all common; the latter is a dangerous animal, more so than the leopard. It attacks man on sight, and is a frequent cause of accidents. In the creeks crocodiles, herons, and wading birds are fairly common.

All the usual tropical insects are abundant; none call for special reference except the mosquito. Mosquitoes abound in all parts of the country, especially where the bush is dense. I am acquainted with the malarial areas near Karasouli, Doiran, and Seres in Western Macedonia, and, to a less degree, with similar places in Bengal. Neither however can equal the Isoko Country for numbers of mosquitoes. In many places it is necessary after nightfall not only to wear mosquito boots but to wrap thick towels round knees and shoulders and other parts of the body where the clothing is thin to avoid being bitten. So much is this the case that it is a relief to get to bed under a mosquito net; even then however no rest is possible until any mosquitoes that have found their way inside have been killed.

The natives suffer to much the same extent as Europeans. They protect themselves either with a net, of which a cheap variety is obtainable in markets, or, failing a net, a party of four or five will sleep in a small hut with the door shut and a smoky wood fire burning in the middle of the hut; the smoke effectively keeping away mosquitoes.

Although the culex and stegomeia species of mosquito exist by the myriad I have only once seen an anopheline mosquito in the Isoko Country; this is the carrier of malaria and a species commonly to be seen, say, in Macedonia or Bengal. Yet malaria is certainly as common in the Isoko Country as it is in

Macedonia or Bengal. Furthermore, mosquitoes are as plentiful in the dry season as in the wet, even though there is then a scarcity of breeding places; what pools there are contain frogs and fish, so that mosquito larvae have but a poor chance of survival. I have fairly often examined pools for larvae, but have rarely found any. As to why malaria is so common I cannot say, unless of course culex mosquitoes can convey it as well as anopheline; and as regards numbers of mosquitoes the general rule seems to be—the thicker the "bush," the more the mosquitoes, quite independent of the number of pools.

Owing to the great amount of water, the climate is warm, close, and steamy, with but little variation of temperature either throughout the year or by day and night. The limits of shade temperature are 95° F. and 75° F.; the thermometer usually standing between 85° and 90° F. The temperature reaches its lowest when the Harmattan is blowing; this cool dry wind from the north carries fine particles of sand, and in the Isoko Country blows for about a week at Christmas time, by its dryness and coolness contrasting strongly with conditions prevailing throughout the rest of the year.

The chief diseases prevalent amongst the natives are malaria, yaws, pneumonia, and smallpox. Less common are filarial diseases, leprosy, and dysentery. I have seen no cases of sleeping sickness, yellow fever, enteric, bilharzia, and hookworm. The absence of bilharzia and hookworm makes it safe to walk on damp soil or wade in water without shoes and stockings.

As to the people. The country is occupied by two tribes, the Isokos and the Erakwa. The Erakwa are but small in number, probably not more than two thousand; they occupy a few villages near Patani; there are also a few of them living at Abo. Although they have a language of their own, for practical purposes they may be reckoned as Isokos, as they are of the same racial stock.

Their neighbours on the north and east are the Abos; on the west the Sobos; and the south the Western (or Patani) Ijaws. The Abos, who take their name from their chief town, Abo, and are ruled by the Obi (*i.e.* "King") of Abo, are a branch of the Ibo nation, and speak a dialect of Ibo. Unlike other Ibos, they are at home on the water, and can handle canoes pretty well, better perhaps than the Isokos can; they like, whenever possible, to have their villages on the water-side. They have a number of villages in the Isoko Country, *e.g.* Ase, Ibredini, Adiawali, Umoru, Onia; all of which are bilingual, Isoko and Abo. Abos are friendly with, but slightly contemptuous of, the Isokos, whom they regard as ignorant but harmless savages.

The attitude of the Ijaws to the Isokos is very different; a feeling of intense hatred exists between the two tribes, and there is sure to be friction whenever they come into contact. The Ijaws never refer to Isokos (or Erakwa) as such, but always call them Igabo, as do the Abos also; similarly the Isokos refer to Ijaws as Ahworia. Both of these are epithets meaning savage, cannibal, or bushman. The Ijaws are a water-loving people, inhabiting the lower parts of the delta, and are far more at home in a canoe than they are on land.

The Isokos and Erakwa are related to the Sobos and Binis; all four may be regarded as branches of the Edo (or Benin) nation. The Isokos claim to have "come from Benin," and undoubtedly at one time were directly ruled by the Obba (or "King") of Benin. It is as well to remark that too much importance

must not be attached to this claim to have "come from Benin," seeing that the Isokos' ancient enemies, the Patani Ijaws, also make a similar claim.

Until about fifteen years ago the Isokos had been almost untouched by European influence, unlike Ijaws, Abos, and Sobos. Previously anything that had been known about them were reports and rumours spread by the hostile Ijaws or contemptuous Abos; so we always find them called Igabos.

For instance, in 'Up the Niger,' narrative of Major Claude MacDonald's mission to the Niger and Benue rivers, which left England in June 1889, there is the following notice: "Descending the river (*i.e.* the Warri or Forcados River) at a rapid rate for 10 miles or so, we came to the mouth of the Ase river, which flows in from the north. A short distance up this tributary lies the trading station of Ase. The inhabitants of the country belong to the Patani tribe, a people chiefly remarkable for their treachery, lawlessness, and love of plunder." (A good description of the Patani Ijaws, but not of the Ase people, who are perfectly respectable Abos!)

Also: "The Ijaw language is said to be peculiar in that it is closely connected with that of the Sobos" (this is incorrect). "About the Agabos little is known at present. They are not a large tribe, but occupy several villages on both banks of the Wari River" (now known as the Forcados). "They speak a distinct language, and appear to be industrious agriculturalists and oil producers."

Again, Major A. G. Leonard, in 'The Lower Niger and its Tribes,' published 1906: "To the north of the Jekri are the Sobo, and to the eastward are the Igabo—shy and timid, no doubt, but treacherous and rude." (That sounds as though the Major got his information from an Ijaw.) He also notes that their language is akin to Sobo and descended from Bini; and that it is different from Ijaw.

The Isokos, like the Ibos, Ijaws, and Edos, are a Sudanese (not Bantu) people. Their original home was much farther north, in the Sudan. Presumably, at the time of Arab expansion some centuries ago, these Sudanese tribes were driven by the Arabs from their homes southward into the Equatorial Forest region. Arrived there, the strongest tribes seized the best country, and the weaker ones had to be content with what was left. The Isokos were undoubtedly one of these weaker tribes, and were compelled to occupy country where conditions of life and the struggle for existence would be of the hardest. No doubt they then well deserved the epithet "Igabo."

Conditions of life in the Isoko Country are very stringent, compared say with parts of the Ibo Country. Owing to the rise and fall of the water, villages, especially when situated near creeks, lakes, or swamps, have to be crowded on to elevated places clear of the floods. Houses have therefore to be small and huddled together, necessitating unhygienic conditions of life. The mud, too, is very sandy and so of poor quality, and the houses therefore have continually to be repaired, especially after rain. It is advisable to cover European houses with a coating of cement. Even with this poor-quality mud many native houses are remarkably good.

Further, owing to the floods, most farming has to be done in the dry season and on poor soil with but little rain. So the Isokos have to depend on cassava, which grows readily and yields a good crop, rather than on yam, which requires

The big tree and native court house, Engwe

Bush path connecting villages

Entering a swamp near Engwe: dry season

Main street of Erueni village

Native rest-house at Ole: banana plantation in background

Crossing a swamp near Engwe: dry season

better soil and takes longer to mature. During the wet season farm work is impossible and fishing occupies the people.

These hard conditions of life have undoubtedly meant racial improvement to the Isokos. Most of the weaklings and misfits have been weeded out, so that now they not only no longer deserve the epithet "Igabo," but are a finer race than the Ijaws, who affect to despise them. Further, they are independent of outside sources, as far as means of livelihood is concerned; they have learnt how to supply their necessities from their own land and water, by farming and fishing. Besides this, they find occupation in extracting palm-oil and kernels from the abundant oil-palms and in selling these products to trading companies. The proceeds are employed in buying what were once only luxuries but are now almost necessities, such as pots and pans, cloth, lamps, kerosene, etc.

The Isokos' ancient form of government was that of village elders: this means that each village was independent of its neighbours and was governed by the oldest male inhabitants, who constituted as it were a town council and were responsible for law and order. There were no native courts, they were not required; the elders had means of knowing everything that occurred in the village. Law-breakers were known and punished without any need of magistrate or police court. This system worked remarkably well; but having no central government such as the Abos have, the Isokos were disunited, and feuds between villages exist to this day. When the British Government took over the country "chiefs" were appointed who held warrants, issued by Government, to judge in native courts, but who had no recognized authority apart from their warrants. This dual control of "chiefs" and elders has at times been a source of considerable friction. I should be glad to see the more ancient form of government reintroduced, but under supervision of district officers.

The Isokos' ancient pagan beliefs are much the same as those of other Southern Nigerian tribes. This may be summed up under that all-inclusive word "ju-ju." It is admitted that there is a great God, the Creator, Oghene; but after creating the world, He lost further interest in it. Consequently the direction of the world is given over to a host of minor spirits, demons, elementals, or whatever you wish to call them. Most of these spirits are malevolent, and take up their abode in trees, ponds, or in "bad bush." These spirits have to be propitiated by offerings of various kinds, otherwise they will do great harm in spreading disease, causing failure of crops, etc. Besides this type of spirit, there are others, who are thought to be interested in men's welfare; each man is believed to have a "creator," a spirit who is responsible for his welfare. This "creator" is usually represented by a small wooden image. Ju-ju in the strict sense of the word is the name for this wooden image; being derived from the French "joujou," meaning toy or doll, though other authorities claim its derivation to be from the French "jeu," meaning play. Ju-ju now has come to have a wider meaning than this, and is taken to include most things connected with the ancient worship.

Each man will pay great respect to the image as representing his creator; seeing that, although this spirit (who may be identified with one of the man's ancestors) is on the whole well intentioned, it is of very uncertain temper, and if not treated respectfully will do some mischief to the man.

I have found no traces of totemism amongst the Isokos, but I have amongst

the Ijaws. In Ijaw villages there may be seen iguanas walking about; these creatures are entirely free to go where they please, and are unmolested. They are sacred animals and are thought to contain the spirits of departed ancestors.

Belief in metamorphosis is stranger still. This I have found amongst the Abos, where it is vouched for and thoroughly believed in by sincere people. Certain people are thought to have power, derived from some occult source, of putting themselves into a trance, and whilst their bodies are thus sleeping, their spirits at night-time appear in the form of were-leopards and were-snakes, and in this form may take revenge on their enemies. Should the were-leopard or were-snake be wounded by gun or matchet that same wound will appear in the body of the man in trance. I have been unable to make out for certain whether it is believed that the man's spirit will use some already existing leopard or snake, or whether a new were-leopard or were-snake will be "created" just for the time the man is in trance, to vanish when he comes out of the trance.

The Isokos' strongest belief is in witchcraft. Certain people, usually old women, are thought to be in communication with evil spirits, and thereby to have the power of visiting their enemies at night-time in some spirit form, and killing them by their "medicine." This belief seems to be ingrained in the Isokos' minds. If a man's children all die, that is thought to be due to witchcraft, usually on the part of his mother-in-law. I investigated one rather curious case. One of our teachers informed me that his mother, a Christian, and three other old women had been seized by the Igbe priest in a certain town, on a charge of causing by witchcraft prolonged illness in a young man, a relation of the chief of the village. I must explain that Igbe is a recently founded organization whose express object is the prevention of witchcraft and punishment of witches. I hurried to the town and, arrived there, I found that our teacher's mother had been released, no doubt owing to fear of the white man; but that the Igbe priest with the consent of the town and before a large audience had performed a trial by ordeal on the three other old women. They had been bound and the sick man brought to them. The Igbe priest then beat the women with sticks to make them confess to having used witchcraft. This failed to do so; so he lighted a fire of sticks, picked up the burning sticks and shook them over the heads of the women, causing a shower of hot embers to fall over them. This made one of the women confess. The Igbe priest, immensely delighted at this, released the other two women and drove the old woman who had confessed into the bush, where she committed suicide. The sick man also died, no doubt as a result of the rough handling he had received in being brought to the trial. I interviewed one of the two old women who were released. She was immensely pleased with herself. No, the beating and the fire hadn't hurt her at all; everything was perfectly all right. Of course the other woman was a witch; it was only right she should be punished.

The punishment of witches was performed on a far larger scale in times gone by. Until it was suppressed, a matter of twenty years ago or so, the service of the Enyi Ju-ju on the shores of Lake Uzere used to attract vast numbers of pilgrims, who came even from the Sobo and Jekri countries. This was an annual service for the detection and punishment of witches, performed by the head ju-ju priest and civil ruler of Uzere, called the Ovie. It has been investi-

gated by my friend and colleague, Rev. J. W. Welch, and it is to him that I am indebted for the following description of the service.

The ceremony began with a procession to Lake Uzere; a cow was sacrificed, the blood poured on the ground, part of the flesh was eaten, part thrown into the lake. The next day the Enyi image was brought out and seven chalk lines were drawn in front of it; it was sprinkled with palm wine, sacrifices were offered, and a feast held. Then the Ovie went into confinement for seven days of purification. On the eighth day he left his confinement, proceeded to the lake in full dress, and the women accused of witchcraft were summoned.

The Ovie carried the carved image, a small horn on his left shoulder, and a sword at his side. Arrived at the water-side he sat down with his wives around him. The witches were presented to him and he threw chalk over them. The witches were then taken in canoes to the middle of the lake, and were told to jump in and swim to the Ovie on the shore. If the accused women were witches, the spirit of the Enyi Ju-ju would push them back as they neared the shore; they would then turn back, swim to the middle of the lake again, and drown. As they drowned they threw up their arms and the number of outstretched fingers showed the number of people they had killed. On the other hand, if any women reached the Ovie they were given a great reception, since it had now been proved that they were not witches.

It was into such an atmosphere as this that Christianity came about fifteen years ago. How it came I am not really sure, except that it was not in the first instance due to white missionaries. As far as I can tell it was due to the preaching of an African Christian, not an Isoko, who visited those parts on business during the war; it is thought that he was a court clerk; his name and his present locality no one knows. His preaching was immensely successful; in a very short time Christian communities had sprung up in most Isoko villages and, at their own request, soon after the war the Church Missionary Society sent white missionaries to them.

I put down this rapid spread of Christianity not to any desire for social betterment; on the contrary, the Christians suffered a great deal of persecution from their heathen neighbours; but because Christianity released them from fear of the spirit world, a fear which is intensely real to heathen Isokos, and gave them peace of mind.

At a low estimate there are now about 18,000 Isoko Christians. From experience I should reckon that there are about five non-Christians to every Christian; this would indicate that the total population is about 100,000. According to the census of 1921 there were 48,844 Isokos; this is a gross understatement. I certainly believe that 100,000 is nearer the truth than 50,000.

The future development of the country can best be described as problematical. There is little hope of economic development. Its sole source of wealth is the oil-palm, which grows wild and has never been cultivated, and the extraction of its products is done in a very primitive manner. It is therefore unlikely that this industry, in its present state, will be able to stand the competition of other countries, where the palm-oil industry is conducted on scientific lines. The annual flooding of half the country would alone forbid any great measure of development.

The development of the people appears to be a more practicable proposition than the development of the country. They are, to a large extent, adopting the best elements in Western civilization by accepting Christianity, and I believe they have a bright future before them, provided they can be kept free from the less desirable elements of our civilization, especially the morality and habits of life associated with seaport towns and certain trading centres; and from over-education, which means idleness, slavish imitation of Europeans, and alienation from the land.

DISCUSSION

Before the paper the PRESIDENT (Admiral Sir WILLIAM GOODENOUGH) said: Some 300 miles north of the Equator and about the same distance to the east of the meridian of Greenwich lies the small and little-known territory of Isoko, in Southern Nigeria. There our lecturer, Mr. Hubbard, has worked among the inhabitants in the pursuit of his vocation. He is a missionary, and he will to-night tell us of that country and of its inhabitants. It is worthy of note that he found himself able, with very small means at his disposal, to make some geographical research.

Mr. Hubbard then read the paper printed above, and a discussion followed.

The PRESIDENT: We have with us Colonel Sir Robert Williams, President of the Church Missionary Society. We should be very glad, Sir Robert, if you would say a word or two.

Sir ROBERT WILLIAMS: I am glad to comply with your request that I should say a few words, in that I am the first to congratulate Mr. Hubbard on the paper he has read. We recognized, as we saw the pictures and listened to his words, the difficulties under which that map was made, and the way in which he kept his eyes and ears open for all sorts of things wherever he went. In a short time he has succeeded in acquiring remarkable knowledge of the inner life of the people. Those who have studied witchcraft will be struck by the fact that the methods are much the same all over the world; for those who practise witchcraft know very well all the weaknesses of human nature and how best to appeal to them. The pictures Mr. Hubbard has shown of the people, their houses, their church, self-built, self-ordained and, in many cases, self-served, show what Christianity has done for them.

Mr. Hubbard deprecated the English setting up chiefs to do away with the particular form of tribal government. I hope that those in power will feel the same. The worst thing you can possibly do for African tribes is to think that a more English form of government will supersede that which has been to them of many many centuries' standing and more or less perfected in that way. I very much hope that all Mr. Hubbard's influence and that of others may be exerted in the sense that we shall do our best to take the people as they are at their best, to help them do away with that which is worst among them, but as far as possible keep their own tribal form, because that which has grown up for many centuries, I am conservative enough to think, is probably the best form to use for higher purposes as more knowledge gets into the people. I thank Mr. Hubbard for the paper he has read.

The PRESIDENT: Major Ruxton has lately been Lieutenant-Governor of Southern Nigeria, and we should be greatly obliged if he could tell us something about his experience.

Major UPTON RUXTON: We have listened to an extraordinarily interesting lecture on what is practically an unknown part of well-known Nigeria. It is

curious it should be so unknown, because, when we come to think of it, for fifty years at least steamers have been ploughing the waters of the Niger, and the town of Baro, which is only 60 miles from Isoko, is a very considerable port, receiving cargo boats from Liverpool, Rotterdam, and New York. The dampness of the country, the lack of colour in sky and water, the steaminess of the atmosphere, the absence of wind, all make it a most undesirable place to live in. It is only those who have a reserve of mental and physical energy who can survive and do good work. Only missionaries and specially selected district officers can carry on in the Niger delta. I have known them, and known them speak of Isoko under that nickname Igabo, which was given to it by the wicked Ijaws of Patani, people who in 1898 used to pop at my launch with blunderbuses and guns, but the launch was armoured with plate, so that no damage was done. As a contrast, thirty years later I went up Ase Creek as far as Ashaka in a large and luxurious stern-wheeler, all complete with wife, shorthand typist, and chef. That is the extent of my knowledge of the Isoko country.

Mr. Hubbard believes in the development of these people, if not altogether of their country, and I agree with him; but how to keep them uncontaminated from outside influences and educate them just far enough and no farther, passes the wit of an administrator. The most we can do for them, as for all African people, is to give them the best of our civilization, and that includes our religion. Mr. Hubbard, who I believe is the only Englishman living in the Isoko country, has been doing that.

The PRESIDENT: We should like to have a word from Mr. Hooper, the Foreign Secretary of the Church Missionary Society.

Mr. HOOPER: I am very tempted not to answer your invitation, because though I was Mr. Hubbard's guest last year in the country of which we have been hearing, the extent of my knowledge is probably a good deal less than that of the last speaker. However, I got to Isoko at the top of a flood and realized something of the wateriness of the country. Going up the Ase creek in the little launch we saw a man come out from the bank in a canoe, and he said it was no use our going to our destination because that was 10 feet under water, but that we should get into his canoe and cross to higher ground at another village. A young missionary had arranged to meet me at his headquarters. I heard afterwards from one of the Assistant District Officers that he had been looking forward to my coming down at that time of year; in fact, he had said, "Wait until we get that fellow out here. We will show him what Isoko is like!" Unfortunately, he did not get the opportunity because, owing to the change of plans, I had to send for him, and he could only reach me by swimming. My impression of the Isoko country was one of water, as you may guess, but also of the amazing cheeriness of the people and their wonderful watercraft. Going along those creeks and rivers one saw children who in England would be in their perambulators, suddenly bob up underneath a canoe, diving and swimming like fish wherever one went. The only remark I would add is that I came away with profound admiration for the men who could "stick it" in the conditions which I was told were best at that time of year when flood water was out and when insects were fewest. What the country must be like when the river is low and great areas of mud are breeding myriads of mosquitoes and other insects, I tremble to think.

The PRESIDENT: Mr. Hubbard, you have interested us greatly. Among other things, you have given us a map, and in the conversations that you have been good enough to let me have with you, you have also told me one or two things which will enable the Society, after proper investigation, to correct the maps which we already have, most especially the placing on the right side of the rivers the towns, villages, and hamlets. That, to travellers in a country so intersected

with rivers, is a matter of great importance. And then you have interested us by saying—and the other speakers have mentioned it also—that the study of geography takes us to the study of the human mind and what is behind it; not matters into which I propose to enter this evening. My recollection of the West Coast of Africa goes back even further than that of Major Ruxton, because the first time I visited the country I was present at no very great distance from the part about which we have heard this evening at the trial of the chief Jaja, when he was before Sir Richard Wells and Consul Hewitt: a very interesting ceremony with planters, merchants, and traders giving their evidence in what was the customary wear out there in those days, namely, pyjamas—very attractive.

In thanking you, as I do, on behalf of the Society, may I, Mr. Hubbard, add to those words of admiration which others have used? You, I know, are going back next January. You will take many good wishes with you. Be assured, I beg of you, that you will take with you the good wishes of the Royal Geographical Society both in gratitude and thanks for the lecture which you have given to-night and also in admiration of the work to which your vocation and duty takes you. Come back to us. Tell us more. When those slides went past I for one wanted to know what those lovely water-lilies were. I would like also to have known more about the people and the trees. So when you come back, as we hope you will do when your spell of work there is over, come and see us. I can assure you, you will be most welcome.

Mr. HUBBARD: I want to say one thing. I am not the only missionary worker in that part of the world. You may have gathered from what one speaker said that that was the case. I have two men colleagues, one of whom has been in the district for a matter of nine years and who is leader of the work there and a very great friend of mine. Besides him, there is another. So there are three men altogether, and in addition we have two ladies working amongst the Isoko women.

THE EARTHQUAKE OFF THE NEWFOUNDLAND BANKS OF 18 NOVEMBER 1929: *A paper read at the Afternoon Meeting of the Society on 8 December 1930, by*

J. W. GREGORY, LL.D., D.SC., F.R.S.

ON 18 November 1929 the coasts of Nova Scotia and Newfoundland were shaken by an earthquake which is said to have been the most violent ever felt in Halifax where, as chimneys were overthrown, it was of the seventh grade on the Rossi-Forel scale. Two and a half hours later, after a recession of the sea, three successive waves, 15 feet high, rolled in against the southern coast of Newfoundland and wrought serious havoc along a length of 30 miles. The waves broke on the southern and eastern shores of the Burin Peninsula and swept inland to the height of 100 feet above sea-level, and on their recoil washed some of the houses out to sea, drowning the inmates. The death roll is reported as twenty-eight. The Anchor liner *Caledonia*, while in a quiet sea about 120 miles east of Sable Island, was suddenly shaken so violently for two minutes that the Captain feared that she had either thrown a propeller blade or was bumping over a sandbank. The engines were at once stopped; and as the machinery was in order, and the sounding showed 110 fathoms no bottom, Captain Collie concluded that the ship had been shaken by an earthquake. The following, due to the courtesy of Mr. W. J. Henderson, is an extract from the *Caledonia's* log:

"Lat. 44° 32′ N. long. 57° 4′ W. Vessel shook violently for period of two minutes.

"4.00 p.m., mod. breeze, slight sea and northerly swell. Overcast sky and clear weather.

"4.52 p.m., violent shiver felt throughout vessel. Stopped engines.

"4.53 p.m. Slow.

"4.59 p.m. Full Speed. Sounded 110 fathoms. No bottom. Vessel sounded fore and aft and found not to be making any water."

The R.M.S. *Olympic*, about 80 miles to the south, was shaken less violently, being 60 miles west of the western line of dislocation and in much deeper water, which, according to the chart, is 2564 fathoms. Captain W. H. Parker reports (*Marine Observer*, vol. vii, p. 221) that while the *Olympic* was travelling at 22 knots in a calm sea, in 42° 12′ N., 56° 56′ W.—approximately 140 miles south-east of Sable Island—a violent vibration was felt on the bridge; it happened at 3.30 p.m. by the ship's time, and lasted for two minutes. The Captain at first thought that a propeller blade had been cast; but as the engines continued to run normally he feared that the ship had struck a submerged wreck. As there was no sign of wreckage aft and as the ship's wells when carefully sounded were found to be dry, he concluded that the shock had been that of an earthquake. The look-out man in the crow's nest described the sensation as if the engines had been put full astern. Most of the passengers were at a kinematograph display and appear to have felt nothing; but the shock extinguished the electric lights in the mail room and the boatswain concluded that the shock was due to an earthquake or a submarine eruption.

The experience of the *Caledonia* indicates that she was near the epicentre and

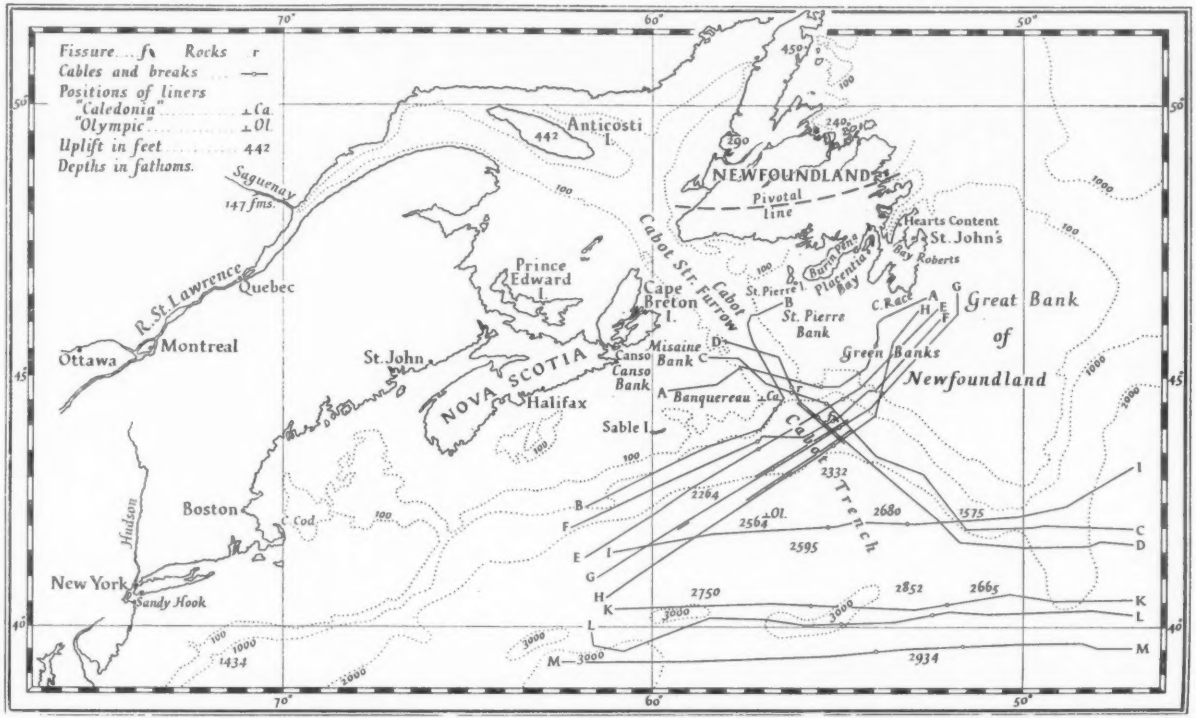


Fig. 1. Sketch-map showing the positions of the breaks in the cables off Newfoundland caused by the earthquake of 18 November 1929

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was shaken by oscillations from below and not by the lateral earthquake wave. Three Norwegian steamers farther east were swept by waves which were probably due to the earthquake. One of them had her steering gear broken and the lifeboats and part of the bridge carried away; another lost her smoke stack and bridge deck, and the third her rudder.

The most serious material damage was to the submarine telegraph cables. Twelve cables, on their way towards Canso, Halifax, and New York, converge into an area 500 miles wide to the south of Newfoundland and south-east of Nova Scotia. Newfoundland is separated from Cape Breton Island by Cabot Strait, on the floor of which is a furrow* trending from north-west to south-east; it has approximately parallel sides and a flat floor which is usually between 200 and 280 fathoms deep. This furrow is continued into the Atlantic for about 150 miles with about the same depth and width, between the St. Pierre Bank, the Green Banks, and the Great Bank of Newfoundland, to the north-east, and by the Misaine Bank, and the Banquereau off Cape Breton Island and Nova Scotia to the south-west. At about 45° N. 56° W. the floor sinks to a larger depression, the Cabot Trench, which is bounded by a fairly regular and steep bank to the north-east and a less regular and lower margin to the south-west. This Cabot Trench is from 500 to over 1000 fathoms deeper than the sea floor on either side.

Of the twelve cables traversing this area all were broken by the earthquake. Most of the cables were apparently at once thrown out of action. Cable G failed at 8 hr. 35 mins. 20 sec. G.M.T. and Cable H at an hour later at 9 hr. 30 min. 17 sec. G.M.T. Two of the cables are reported to have been broken at 9.18 G.M.T. on the 19th and some of them farther south at 10 a.m. on the same day; these cables either yielded then to a stress that had been acting for about thirteen to fourteen hours or they were broken by a subsequent earth-movement or slip of the sea floor.

Commander L. Robinson, of the Western Union Telegraph Co. and other cable companies, kindly informed me that the electrical tests from the shore ends showed that eleven of the cables were broken in at least two places and that the main fractures were in two approximately parallel lines. From the information kindly given me by Commander Robinson and Mr. R. J. Hughes of the Commercial Cable Co., I attributed the earthquake in articles in the *Manchester Guardian*, 17 December 1929, and in *Nature*, 21 December 1929, to the subsidence of a strip of the ocean floor in continuation of the deep channel of Cabot Strait.

The preliminary determinations of the positions of the fractures have now been confirmed by the work of the cable ships. I am indebted to Commander Robinson for information as to the results yielded by the British repair operations.

The results are shown in Fig. 1 in which the cables are marked A–M. A is an old cable in shallow water. Commander Robinson remarks that it has given much trouble and been previously interrupted by local causes. Its north-

*The terms "furrow" and "trench" are used as recommended for submarine forms by the International Geographical Congress; *cf. Geogr. Journ.*, 22, 1903, pp. 191–194. A furrow is a submarine valley in a continental border. A trench is a long depression which is larger and narrower than a trough.

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eastern break, the northernmost of the series, may be due to some secondary movement; but its south-western break is on the north-eastern line of fractures and is on the edge of the steep drop from the St. Pierre Bank to the Cabot Trench.

Cable B is also comparatively shallow. Its single fracture was on the south-western line and was the nearest to the position of the *Caledonia*.

Cables C and D run for some distance approximately parallel and in line with the north-eastern side of the Cabot furrow. Both were broken close by the place where cable D crosses C. The second fracture on cable C was farther to the east-south-east and near the intersection of its line with that of cable E.

Cable D was badly damaged, between the splice at 44° 47′ N., 56° 10′ W. at the depth of 315 fathoms, and the splice at 43° 52′ N. and 54° 58′ W. at the depth of 1900 fathoms; it appears to have been lying close beside one of the main lines of disturbance and was so damaged that 81 miles have been replaced by new cable. Commander Robinson tells me that the ships reported that soundings taken between the splices seem to agree with the natural slope of the bottom and that "soundings in vicinity of operations appear unaltered, but cable seemed to be buried to a depth of several feet by a layer of very stiff clay." At about a third of the distance between the two splices from the south-eastern splice the cable was deeply buried and the bottom "very rough." The depths at the splices are consistent with those on the Admiralty Chart 2666 (large corrections up to December 1927).

Three rock specimens were collected near the northern fractures on cables C and D. They were brought up by the grapnels after dragging between 44° 43′ 12″ N., 56° 16′ 12″ W. and 44° 48′ 24″ N., 56° 16′ 20″ W., and between 44° 40′ 6″ N., 56° 15′ 45″ W., and 44° 45′ 12″ N., and 56° 15′ 10″ W. The largest specimen ($4\frac{1}{2} \times 3 \times 2{\cdot}8$ inches) is a light grey schistose limestone, which has many clear glacial scratches; a dark blue basaltic cobble ($4 \times 2{\cdot}6 \times 1{\cdot}8$ inches) has short blunt glacial scratches; the third is an angular pebble of schistose quartzite ($2 \times 1\frac{1}{2} \times 1$ inches). These specimens are of glacial origin, and may have been dragged by the grapnel from boulder clay, or may have been dropped on to the sea floor from drifting ice. They show no trace of encrusting organisms, the two larger had been embedded in clay, and their shape is that characteristic of stones in boulder clay. Hence they were probably from a boulder clay and may have been exposed on the sea floor by a rush of water due to the earthquake.

These boulders were collected between depths of 505, 510, 518, and 635 fathoms. The depths nearest the position on the Admiralty Chart are 215 and 430 fathoms, so that a subsidence of at least 70–80 fathoms would not be inconsistent with the older and newer soundings.

The next four cables, E to H, trend approximately parallel on a course from east-north-east to west-south-west. They cross the middle of the Cabot Trench between about 44° 10′ N. and 43° 20′ N. Each of these cables was fractured in two or more places.

Cable E had two fractures. Near the western splice was found a depth of 1850 fathoms, a little east-north-east of the depth of 1489 fathoms on the Admiralty Chart. Near a sounding of 1632 fathoms on the Admiralty Chart the bottom is reported to be now very irregular; and farther east the ground is

described as "tough pebbly clay." The eastern splice on E at 44° 35′ N., 54° 56′ W. is at the depth of 1110 fathoms.

Cable F lies west of the Cabot Trench at a depth of 1489 fathoms; it descends in 7 miles to 1855 fathoms, where the cable was spliced; a little farther on, at 1735 fathoms, it was found buried. The eastern splice at 44° 20′ N., 54° 49′ W. is in 1309 fathoms, and 15 miles eastward the soundings found what is reported as a new fissure trending about north and south and 9 miles long and up to 2 miles wide. The floor of the fissure is very irregular and consists of black mud and stones, and is at the depth of 1850–1950 fathoms. The nearest depths given on the Admiralty Chart are 1752 fathoms, 8 miles west, and 1530 fathoms, 4 miles east.

Cable G had two separate areas of major disturbance; at the western end for a distance of 13 miles the cable was so injured that it had to be replaced. The depth between these two splices is 2388 fathoms. Farther east 99 miles of this cable had to be replaced. At the original fracture "the cable," reports Commander Robinson, "was broken off short as if cut with an axe." The reports of the four repair ships agree that the cable was buried for long distances or was broken up into very short lengths. These fractures suggest the action of parallel faults. Cable H, which was parallel to G, was so seriously damaged in the same area that 101 miles have had to be relaid.

Cables I, K, L, M are approximately parallel and their course is east to west. Cables I and K, with two fractures in each, belong to the Compagnie Française des Cables Telégraphiques. I have no confirmation of the positions on I and K reported and marked on the map in *Nature*, 21 December 1929.

Cable L has been so badly damaged west of the eastern break that it has been abandoned and relaid on a new course to the north-west. Cable M, the southernmost of the series, lies along a line where considerable changes in depth were at first reported; but they have not been confirmed. The cable is buried and between the two breaks has been completely lost; the repeated attempts to pick up the cable have hitherto failed.

Nature of the Disturbance

The evidence available shows that the cables were broken along parallel lines as shown by Fig. 1 on either side of the outer part of Cabot Strait and its continuation the Cabot Trench. The evidence of the repair operations confirms the conclusions founded on the preliminary determinations, and show that the movement was due to a renewed subsidence of the floor of the Cabot Furrow and Trench, between two parallel series of faults. The fractures were not on a single pair of faults, but were probably on two main sets of faults, each set along one side of this great submarine rift-valley.

Changes in Depth of the Ocean Floor

Shortly after the earthquake it was reported by a Reuter's Telegram from Halifax, N.S., on 16 December 1929, that "the depths of the ocean bed had been radically changed over the affected area and will need to be recharted." This statement was apparently a surmise based on inadequate evidence.

It was also reported that Captain Ellsen, commander of the *Kingsholm*, of the Swedish American Line, had sounded on a course of 200 miles when

approaching Cape Race, and found variations of 40–50 fathoms from the depths marked in the current charts. A statement that great changes in depth have taken place has been attributed, apparently without adequate foundation, to the authority of the cable-ship *Cambria*. Such reports appeared not improbable, as displacement of the crust is a common accompaniment of powerful earthquakes. Thus, on the occasion of the earthquake of 1 September 1923, which devastated Tokyo and Yokohama, part of Sagami Bay was deepened by 400 metres (*cf.* Chart by Japanese Naval Hydrographic Department, "The Great Earthquake of 1923 in Japan," Bureau of Social Affairs, Japan, 1926, pl. II. in vol. of maps). The cable was broken 7 miles off the Grecian island Zante on 26 October 1873 by a subsidence which is said to have left a fault scarp 600 feet high. If any such changes had taken place along the Cabot Trench they would have been discovered, but the later reports of the cable ships are that few changes in depth have been established. Disastrous earthquakes however happen with slight displacements of the crust. The earthquake which played havoc with parts of San Francisco in 1906 was due to a horizontal movement, which at its maximum was 21 feet and was in few places more than 10 feet. The Tango Earthquake in Japan on 7 March 1927, which caused devastation and loss of life second only to that of 1 September 1923, was attended by fresh movements along the faults and rift-valleys of the Takeno and Fukuda Rivers; the maximum displacement along the Gomura fault was only 2·5 metres, and along the Yamada fault 0·8 metre.*

Displacements of that extent, at the depth of from 1000 to 3000 fathoms, would not be recognized by sounding, especially as fault scarps a few feet high might be buried by the redeposition of material churned up by the disturbance.

The soundings reported by the cable repair ships do however indicate that some changes in depth have happened. The new soundings are in some cases deeper than the nearest marked in the latest Admiralty Chart (St. John's to Halifax and the Outer Banks. No. 2666. Corrections to December 1927).

Thus at the splices where the cables marked C and D are near together the depths marked on the chart are 215 and 430 fathoms; but the depths now recorded vary from 505 fathoms near the 215 point, down to 635 fathoms.

The depths near the western splice of cable F are given on the chart as 1622, 1489, and 1632 fathoms, and farther east, near the crossing of cables E and F, the depths are now found to be 1855 and 1735 fathoms. The fissure near the easternmost fracture on cable F lies between depths charted as 1752 and 1530 fathoms; and the depth in the fissure is now found to be from 1850 to 1950 fathoms.

The 13 miles of replaced cable at the western part of cable G is at the depth at each end of 2388 fathoms; the nearest depths on the chart are 2264 fathoms to the north-west and 1840 fathoms to the south-east. The depth at the eastern splice on cable G is found to be 1650 fathoms; and 1608 fathoms is marked 11 miles along the cable to the west-south-west, and the water at the splice would be expected to be more shallow as the floor is rising to the Green Banks. The breaking of cable G into short lengths suggests parallel displacements of the floor. The repair operations also indicate that there has been considerable

*Naomasa Yamasaki and Fumio Tada, "The Faults of the Tango Earthquake of 1927," *Proc. Imp. Acad. Tokyo*, III, 1927, No. 4, pp. 2, 3.

shift of the ocean-floor deposits. The cables have been buried so deeply in places that the grapnels have missed them.

The most remarkable change in the sea floor is the formation of a depression which is described in the reports as a fissure, 9 miles long and from 1 to 2 miles broad. It has broken across cable F at the foot of the steep slope from the Green Banks. The depth of this fissure is 1850–1950 fathoms between depths marked on the Admiralty Chart as 1752 and 1530 fathoms. The trend of the fissure was reported as north and south; but the evidence does not preclude sufficient divergence from the meridian for it to trend north-north-west to south-south-east and be parallel to the main earthquake fractures. Whether this trough is a secondary rift-valley on the margin of the Cabot Trench or is due to a downfold, there is no definite evidence; but it certainly marks an important subsidence, and from its general relations faulting is its more probable cause.

Submarine Canyons

This earthquake bears on several geological and geographical problems, including the nature of submarine canyons. Some of the great Atlantic river valleys are continued under the ocean by deep narrow submarine channels, such as those off the Congo, off the Adour in the Bay of Biscay, and off the Hudson River near New York. Broader, less canyon-like valleys also occur, as off Cape Verde.*

Some of these canyons are of great depth. The canyon of the Congo, according to the dimensions given by Hull,† is 122 miles long, reaches a depth of 1200 fathoms, and its furrow is over 800 fathoms deep in the coastal shelf of 250 fathoms deep. The evidence for the fiords off the American Coast of the North Atlantic has been summarized by J. W. W. Spencer,‡ and he describes the "Hudsonian submarine valley" as 75 miles long; the valley is known to be 300 feet deep and filled with drifts in NewYork City. It is doubtless partially filled where it appears, 93 miles from Sandy Hook, as a trench 800 feet deep where the sea is 330 feet; it then turns eastward, deepens further, and, notching the Continental slope, says Spencer, "the maximum depth of the cañon reaches 4000 feet, where the Continental Slope is submerged only 1000 feet." The Admiralty Chart (3272) records the depth at the end of this canyon as 1434 fathoms, or over 8000 feet below sea-level.

Various explanations of these valleys have been offered, including glacial erosion.

The evidence of the recent earthquake indicates that these submarine canyons, like fiord troughs which are probably of the same nature, are tectonic and in most cases of the nature of rift-valleys. The fiord basins of Labrador§ and of the Saguenay (*cf.* Fig. 2) on the St. Lawrence, which is in line with the

*H. Benest, "Submarine Gullies, River Outlets, and Freshwater Escapes beneath the Sea-level," *Geogr. Journ.*, 14, 1899, pp. 396, 399, 403, map opp. p. 472.

†E. Hull, 'Sub-Oceanic Physiography of the North Atlantic Ocean,' 1912, p. 13, pl. VI.

‡In Hull, *op. cit.*, pp. 21–30, pl. X, XI; *cf.* also M. L. Fuller, "Geol. Long Island," U.S. Prof. Pap. 82, 1914.

§Evidence of the tectonic origin of the Labrador fiords is stated in Gregory, 'The Nature and Origin of Fiords,' 1913, pp. 278–284.

southern coast of Newfoundland and 147 fathoms deep, are probably of the same nature. Thus this earthquake affords additional evidence of the tectonic origin of fiords in general. Professor R. A. Daly* describes the submarine Hudson Canyon as "a rather typical fiord depression" and due to the combined

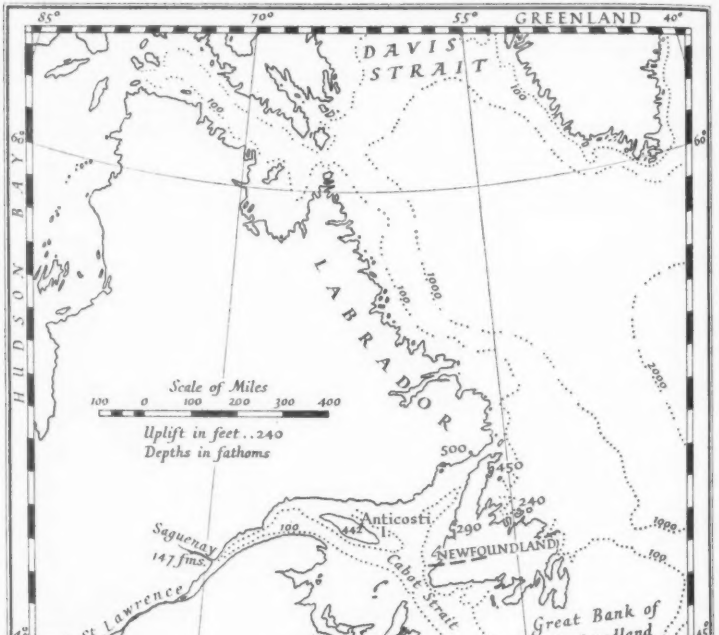

Fig. 2. Sketch-map of the submarine topography of the North-West Atlantic

effect of crustal warping, glacial and river-erosion. Its tectonic origin was also adopted by W. O. Crosby.

The tectonic origin of the Cabot Strait and of the Hudson valley fits in with the general relief of eastern North America. Cabot Strait is parallel to

*"Oscillation of Level in Belts peripheral to Pleistocene Ice Caps," *Bull. Geol. Soc. Amer.*, XXXI, 1920, p. 313.

the deep basin of Davis Strait between the mainland and Greenland, and corresponds to a Davis Strait on a smaller scale.

The Hudson River valley is probably a tectonic valley of a still smaller size. It has been attributed to corrosion by rivers and glaciers along bands of limestone. Professor Hobbs* has already demonstrated that that explanation is contrary to the facts, which are in favour of the determination of the main network of valleys around New York by faulting.

The difficulty with the formation of these canyons by rivers and glaciers is their great depth. It is not likely that glacial action could have operated at the mouth of the Congo. The excavation of the deep basin in the Hudson valley in New York by glacial action is of course possible; but for the excavation of its submarine continuation by a river and ice the land must have stood several thousand feet higher than at present in time so recent that the gorge has not been filled. Moreover there seems no other indication of such a stupendous subsidence of the belt along this part of the American coast.

Cabot Strait is in a position where crustal fracture would be likely to happen. Professor Daly has pointed out that Newfoundland has been tilted in post-glacial times along a pivotal line across the southern part of the island near St. John's.† Northern Newfoundland, Anticosti,‡ and the coast of Labrador have been uplifted 500 feet while the southern coast has been sinking.

The tilting of the north-eastern coast of America has been frequently claimed to extend farther south than Newfoundland by glacial geologists.§ According to Professor Fairchild the whole of New England, down to New York or even to Philadelphia, has been tilted in post-glacial times, the land to the north having been upraised by an amount which increased from zero at Philadelphia

*W. H. Hobbs, "Origin of the Channels surrounding Manhattan Island, New York," *Bull. Geol. Soc. Amer.*, XVI, 1905, pp. 179–182. This paper gives full references to the views of Dana and earlier authors who regarded the valley as due to corrosion. The excavation both of the drift-filled gorge of the Hudson River near New York and of its extension "nearly 100 miles out to sea where it is a veritable canyon from 3000 to 4000 feet deep" by a river followed by a glacier, when the land was "several thousand feet" higher than at present, is however adopted by Professor C. P. Berkey and Jas. F. Sanborn, "Engineering Geology of the Catskill Water Supply," *Trans. Amer. Soc. Civ. Eng.*, LXXXVI, 1923, pp. 49–50, p. 10.

†My quotation in *Nature*, 21 December 1929, of Professor Daly as in support of the tilting of Newfoundland and the stationary position of the St. John's pivotal line has been questioned by some correspondents who represent his opinion as exactly the contrary. Professor Daly concluded in 1900 (in W. T. Grenfell, 'Labrador,' 1913, p. 117) from the boulder distribution near St. John's that that locality, like Northern Newfoundland, had been uplifted 500 feet in post-glacial times. I did not refer to that view, as Professor Daly has abandoned it in his paper of 1921. Unluckily, his original map and assertions of the uplift of St. John's were subsequently reissued in the second edition of Sir Wilfred Grenfell's 'Labrador' (1922, Fig. 17, pp. 117, 135). Professor Daly has since reaffirmed the stationary position of St. John's in a map in 'Our Mobile Earth,' 1926, p. 195.

‡W. H. Twenhofel and W. H. Conine, "The Post-Glacial Terraces of Anticosti Island," *Amer. Journ. Sci.* (5), I, 1921, pp. 271, 277. The uplift is up to 442 feet.

§As by Professor H. L. Fairchild, "Pleistocene Uplift of New York and Adjacent Territory," *Bull. Geol. Soc. Amer.*, XXVII, 1916, pp. 237–240, pl. X, XII; *ibid.*, XXIX, 1918, pp. 187–238. J. W. Goldthwait, "Submergence and Post-glacial Uplift in New Hampshire," *Bull. Geol. Soc. Amer.*, XXXI, 1920, pp. 112–113, holds the same, though on different grounds.

to 740 feet on the northern frontier of New York State and beside the St. Lawrence above Montreal. According to Goldthwait the uplift in New Hampshire has been 150 feet. This view has been correlated with the efforts to date the glaciation by the seasonally banded clays. However, R. F. Flint* has thrown doubt on the supposed differential movement of Connecticut, and if his conclusions are confirmed local tilting does not explain the earthquakes along the north-eastern coast of the United States.

The identification of the Cabot Trench as a rift-valley implies that the movement was a subsidence of its floor. Professor Bailey Willis' view that the Jordan-Dead Sea trough is a ramp-valley due to the uplift of its sides by compression, and not a rift-valley, raises the issue whether the earth movement off Newfoundland may also have been an uplift of the Banks beside the Cabot Trench.

The southern coast of Newfoundland and the south-eastern coast of Novia Scotia have both the characteristic features of coasts drowned by subsidence, while Newfoundland, north of the pivotal line through St. John's, is shown by its raised beaches to have been uplifted by a movement which increases northward. Hence the area of Cabot Strait and Trench is in a subsiding area, and it is improbable that the Banks are due to uplift. It seems clear that the depression in continuation of Cabot Strait is due to subsidence, and not to the uplift of its sides.

The evidence of the earthquake of 18 November 1929 supports the view that the submarine canyons off the Congo, the Hudson, and the Adour are also tectonic.

The Earthquake Belt

The north-eastern coast of the United States and the eastern coast of Canada have often been regarded as one of the most stable areas in the world and unusually free from seismic activity. Montessus de Ballore† says the same for the St. Lawrence basin, and he remarks that in South-Eastern Canada earthquakes are not really to be feared.

It is true that the Atlantic coast of the United States has far fewer earthquakes than the Pacific coast; for in the years of 1915–1923, while the Atlantic coast states had one or two earthquakes each, California had 594. Nevertheless serious earthquakes happen along the Atlantic coast at long intervals and appear to be deep-seated and widely distributed.

The most famous are those of Charlestown in 1866, and of Boston in 1755; and in Eastern Canada many have been recorded. Monsignor J. C. F. Laflamme‡ has collected the records of those along the St. Lawrence from 1637 to 1907. The most famous historically is that of 5 February 1663, which, according to the traditions, must have been of the highest order of violence, though Mgr. Laflamme considers the accounts exaggerated. The last of the great east Canadian earthquakes was that in 5 February 1925, which had its centre in the Saguenay Fiord. The earthquakes of this East American series

*"Pleistocene Terraces of the Lower Connecticut Valley," *Bull. Geol. Soc. Amer.*, XXXIX, 1928, pp. 955–984.

†'Géographie Seismologique,' 1906, p. 115.

‡"Les tremblements de terre de la région de Québec," *Trans. R. Soc. Canada* (3), I, sect. 4, 1907, pp. 157–183.

must, from their widespread range, be of deep-seated origin. This series indicate that earth movements take place occasionally along deep fractures beneath the eastern coastlands of North America. Fortunately they affect any one part of the line only at distant intervals of time.

That some of the earthquakes along this belt started under the Atlantic is well established. The earthquake in 1774, which caused a death roll of over three hundred in the Burin Peninsula of southern Newfoundland, may have had its origin in earlier movements of the Cabot Trench. The map by John Milne (Rep. British Assoc. 1905, Pl. I, p. 83) of the earthquakes between 1899 and 1903 shows that an area between Newfoundland and the Azores is especially liable to them. Whether they have previously injured the telegraph cables is uncertain. The *Times*, 21 November 1929, reported that the disaster of last winter is believed to be the first time that the North Atlantic cables have been injured by earthquake. But Milne, in his classic paper on "Suboceanic Seismology" (*Geogr. Journ.*, 10, 1907, pp. 261–262), suggested that the breaking of three cables 330 miles east of Newfoundland, on 4 October 1884, was by an earthquake, since the three fractures were simultaneous and on the same line. He recognized that no change in depth had been discovered; but he remarked that a displacement large enough to have broken the cables might be too small to be detected by sounding, and he referred as evidence of disturbance that one of the cables had been buried, possibly by the slipping of material down the Newfoundland Bank. Commander Robinson has carefully examined all the reports on this interruption and tells me that he sees no evidence that it was in any way connected with earthquake action. The evidence is however clear that the disastrous breaking of the cables in November 1929 was due to an earthquake, which was so powerful as to have caused a strong oscillation of the Seismograph at Kew at the distance of 2470 miles. The Superintendent of the Kew Observatory kindly tells me that the record began there with the arrival of the P waves at 20 hr. 39 m. 10 s., of the S waves at 20 hr. 44 m. 53 s., and of the L waves at 20 hr. 47 m. 0 s. He also tells me that he adopts the time of the earthquake as 20 hr. 31 m. 56 s. G.M.T., and that it is estimated at the observatory at Ottawa as 20 hr. 32 m. 0·8 s., and at Strasbourg as 20 hr. 31 m. 50 s. The local time was therefore approximately 4 hr. 32 m., and as the time given by the *Caledonia* was 4 hr. 32 m., that ship must have been near the epicentre.

To summarize the geographical results of this earthquake, the distribution of the cable fractures along two approximately parallel series, one on each side of the Cabot Trench, indicates that the earthquake was due to fresh movements along its sides. The epicentre is a band extending from about 45° to 39° N. and from 57° to 57½° W. The Cabot Trench is an extension of the parallel-sided, flat-floored furrow that lies along Cabot Strait; and the breaking of the cables on both sides of that trench indicates that the movement was a renewed subsidence of the floor between parallel faults, and that the trench is a submarine rift-valley. To what extent the subsidence has been detected by recent soundings is uncertain. Repeated reports claim great changes in the depths, and considerable differences occur between the soundings made by the cable ships and the nearest depths marked on the Admiralty charts. The cable ships have also discovered a new fissure or sub-trench 9 miles long,

12 miles wide on one margin of the main trench; it cuts across Cable F (Fig. 1).

On the other hand, the authorities of the cable ships remark that in various places there is no evidence of change in depth. In view of that opinion the early reports are doubtless exaggerated; but as the earthquake was sufficiently powerful to break cables over an area extending 360 miles N. and S. and 150 miles E. and W. some displacement of the sea floor is probable.

The clear evidence that Cabot Strait and Trench is a submarine rift valley indicates that the submarine canyons off the Congo and the Hudson and the Adour are probably also tectonic and due to subsidence of the ocean floor along faults.*

DISCUSSION

Before the paper the PRESIDENT (Admiral Sir WILLIAM GOODENOUGH) said: Dr. Meinesz' lecture, delivered four weeks ago, was an admirable prelude to the one that we shall hear this afternoon from Professor Gregory. Dr. Meinesz spoke of what I think might well be described as submarine geomorphology, and Professor Gregory—there is no one who could better do it—will speak of what occurred in one of the changes. The great upheavals of which he will speak took place, fortunately, in the ocean, and the loss of life was not very great; though the damage to cables was considerable it was otherwise not serious. Nevertheless, as in very many other natural phenomena, it retarded human progress.

Professor Gregory then read the paper printed above, and a discussion followed.

The PRESIDENT: We would be glad if Admiral Douglas would tell us something of the soundings in this area, of which we do not know as much as we might.

Rear-Admiral H. P. DOUGLAS (Hydrographer of the Navy): I was interested to receive a communication from the Canadian Hydrographer on this subject some months ago. He had been trying out the Admiralty patent echo-sounding apparatus, and in the course of work off Nova Scotia he sounded over the whole of the route shown on the map. In his letter forwarding the soundings he said he did not find very much change, but it is obvious to me that what he would call a great change and what Professor Gregory would call a great change is quite a different matter. From a sailor's point of view a matter of 10 fathoms in 200 does not matter. But actually it is 60 feet, and I think if there was a hole 60 feet deep the geologist would think a great deal more of it than the sailor, especially at those depths.

Another point of interest is in connection with the merits of the echo-sounding apparatus. There is no doubt that in an investigation such as that described one has to be somewhat chary of accepting the soundings shown on Admiralty Charts, because they were taken probably fifty, sometimes one hundred, years ago when the old-fashioned method of using lead and a rope was in vogue. After that they

*Commander Robinson has shown me a series of samples obtained by sounding by the cable ships *John W. Mackay* and *Faraday* from the north-western end of the Cabot Trench: they are mostly grey, brown, and reddish clays. They include, from a depth of 1600 fm. on the edge of the trench at 43° 57′ N. and 56° 55′ W., a brown clay with a small glaciated pebble; this sample appears to be a glacial clay.

He has also shown me specimens collected by the *Cambria*, and upon which the reported submarine lava streams are based. They do not appear to be volcanic.

Papers on this earthquake by E. A. Hodgson, W. W. Dorsee, and A. Keith have been read to the American Seismological Society, but are not contained in the parts of its *Bulletin* received up to date in this Society's Library, the last being that for September 1930.

passed to the Bailey-Driver type with wire, and now we have the echo. There is no doubt that with the ordinary hemp line we were hopelessly out in our soundings. With a wire we were better, but in such great depths it is hard, from a ship, to get the wire absolutely up and down and therefore to get up-and-down soundings, whereas by means of echo-soundings it is possible to sound at practically any speed and any depth and to be right within a very slight percentage of error. The only objection to echo-sounding is that it does not give the nature of the bottom, but from every other point of view it is a most valuable asset. Without it I am quite sure the cable ships would not have been able to get half the soundings they did. The echo-sounding apparatus gives soundings pretty well continuously, if you wish.

The PRESIDENT: We should like to hear a word or two from Commander Robinson, who has provided details of the repair operations to the cables.

Commander ROBINSON: I was not in charge of the repair operations but I was able to get information for Professor Gregory chiefly because I had access to the records of the companies. I have had no practical experience of cable work in very deep waters; all my cable experience has been confined to depths of under 500 fathoms, though I have naturally read many reports dealing with the whole subject. Practically all the information I could give as to the occurrence under discussion has been embodied by Professor Gregory in the paper he has read, but he has asked me to add a few words on one or two particular points.

First, as to the specific gravity of cables: the specific gravity of deep-sea cables —that is, the small cable used in deep water—is 2·4, and that of the heavier types used in up to about 200 fathoms is 3·9. Cable does, of course, go right to the bottom of the ocean. I expect everybody here realizes that, but there is a popular idea that it is suspended some way off the bottom. That idea is based on an erroneous impression that pressure alters the specific gravity of the water and that, as the cable goes deeper down, pressure prevents it from falling to the bottom. That is entirely erroneous.

Then I am asked to explain the extent to which cables lie flat on the ground or hang suspended across hollows. That, I am sorry to say, as with several of the questions which Professor Gregory has put to me, is a matter of great controversy in the cable world. There is no doubt that on a smooth bottom the cable lies very nearly flat, but as 5 per cent. to 7 per cent. slack is laid in deep-sea sections (say 1000 fathoms and over) the cable is probably a little wavy in places. Then we come to the question of suspension, and here there is a great deal more doubt. The general idea is that there is a considerable amount of suspension over bad ground, more particularly in deep water. I cannot help thinking, after studying many records, that that idea is largely erroneous. You have perhaps seen relief models, produced, I am sorry to say, by cable companies, purporting to show the ocean bottom across the Atlantic, with red lines indicating the cables. Those of course are terribly misleading, because in those models the vertical and the horizontal scale are entirely different. The same applies to certain graphs which are published in many technical journals and in the popular press, and I refer particularly to those published in technical journals, when sonic sounding methods were first brought out, about a voyage by a U.S. Government vessel. Graphs were produced showing records which looked something like the outline of the Alps. Such graphs are really very misleading, because if you draw them to scale you will find that apparently precipitous peaks will prove to be gentle slopes. If cables were laid in the same way as overhead telegraph or telephone wires with heavy strain, no doubt they would lie between the peaks; that is, suspension might be considerable. But, as I have already explained, there is a certain percentage of slack when cables are laid in deep-sea sections, and I

cannot therefore see that suspension over any large area would be at all likely. In shallow water—500 fathoms and under—I feel still more confident in saying that the risk of suspension is exaggerated. Here again it is perhaps unnecessary to enlarge on the subject in such a gathering, but even sailormen will take one to a chart and point out what are apparently precipitous slopes where, in fact, none exist. I have worked out a large number of cases on the western coast of Europe and in the great majority apparently steep places are actually slopes of the order of 1 in 20 or, at most, 1 in 15, over which I do not think there is any possibility of suspension. I can find only two places on the west coast of Europe at all steep where cables are laid, one off the mouth of the Tagus, about 15 miles from the shore, where slopes of 1 in 5 are found, and a similar slope in one place off Cape St. Vincent. Slopes of 1 in 15 or 1 in 20 are almost unnoticeable, and even slopes of 1 in 5 would do no harm to cables, and there would be no fear of suspension. Soundings, of course, are the only guide as to the nature of the bottom, and if they only show a gradual slope it seems right to infer that there is nothing in the way of sharp precipitous places. My personal opinion therefore is that except in a few special places in deep water, fear of suspension is largely a bogey, but I would emphasize that this is my personal opinion and not the general opinion in the cable world. This is, of course, omitting consideration of the rough bottom within 5 miles of the shore.

Then I am asked to say something with regard to changes of depth in the area which Admiral Douglas has dealt with. Again, that is a matter of opinion, but I am inclined to the view that the change is not very great except in two places. The soundings on Admiralty Charts are not close together, positions of cable ships and of soundings cannot be guaranteed as absolutely accurate, and comparison between present-day soundings and those recorded on charts made many years ago should be made with considerable caution. Changes of 100 fathoms or so in depths of 2000–3000 are not very easily observed; but there may be considerable alterations. In this connection I should like to quote two opinions from ships which were on the spot. The cable ship *Dominia* was in the southern part of the area shown on the map. Whilst she was grappling at a speed of about 2 knots in long. 53° 47′ W., lat. about 39° 30′ N., "half-hourly sonic soundings were taken, but there was no indication that any change had taken place in the nature of the bottom . . . (which) consisted of fine gritty sand." The same ship later in the same report says: "No proof, or reason to suppose, that any appreciable change had occurred in the nature of the bottom where we were working. The depths were just as we expected them, and the bottom specimens obtained were such as have been noted on the charts as having been found frequently in the Gulf Stream." The same ship working in 43° 27′ N., 56° 20′ W., says: "The bottom appeared to be soft and smooth, and frequent sonic soundings were taken, all corroborating those marked on the charts. The earthquake did not appear to have changed the nature of the bottom here." All ships admitted that over a considerable distance the cables were buried.

On the other hand, there are two or three definite cases. One is in the vicinity of the gully Professor Gregory mentioned in the northern part, 44° 15′ N., 55° 08′ W., where it is reported that the bottom was very uneven, differences of 500 fathoms having been found in depths less than 5 miles apart. That sounds a great deal in that 500 fathoms is 3000 feet. To go back to the question of suspension for a moment, 500 fathoms in 5 miles is only a slope of 1 in 10, which is not a great deal for cables, whatever Professor Gregory may say on the subject. Another place in which there were decided differences of soundings was at the eastern end of the southern part of the area, where the cable ship *Cambria* reported 2400 and 3400 fathoms close together, where 3000 is marked on the chart.

Then I am asked to give my opinion as to whether the area should be re-charted; but, as Admiral Douglas is here, I do not think I need say much about that. In view of the small number of considerable changes in depth found by cable ships, I am doubtful if re-charting the area, from the cable point of view, would be justifiable. It would be interesting to know if changes have really taken place, and to provide a better basis for comparison in future; also it would certainly be useful if such survey could detect unstable slopes which might be dangerous to cables, but I am doubtful if the latter could be established with any certainty. I cannot give the cable companies' opinions on the subject, but I think it very doubtful if they would agree to bear the expense, or part of it, of re-sounding the area. It would hardly be worth while from their point of view.

The last subject on which I am asked to say anything is as to the earthquake of 1884 breaking the cables. I am asked to deal with Professor Milne's opinion, given on pp. 261–262 of the *Geographical Journal*, September 1897, in which he attributes the breaking of three cables in October 1884 to earthquake. I venture to disagree with such an authority with much diffidence, particularly as he may have had access to information which is not now available, but I have carefully examined three very long reports on the work on two of these cables (one unsuccessful attempt in December 1884, and two repairs carried out in the following summer) but can find no evidence of damage being due to earthquake. The reports are very voluminous, running to 130 pages foolscap, containing comments of all kinds in connection with the work, but no mention of or reference to earthquake being the cause of the damage.

Another point on this question. In 1884 work was done on the south-eastern slope of the Great Bank off Newfoundland, which is quite a long way from Cabot Strait. There were five cases given by Professor Milne in the *Geographical Journal*, in which he inferred that the cables were broken by earthquake. I have tried to trace them, but they are very difficult to follow because he did not give details. One is supposed to have been in September 1887. That was probably the Brest—St. Pierre cable in 42° 45′ N., 50° 04′ W. to 43° 57′, 46° 10′ W., but there is no information as to cause. The next is in October 1884, which was one of the two cables I have already mentioned, and the third was the other already mentioned above. The fourth was, again, October 1884, and there seems to be no doubt that that is a repetition of the third which occurred by some mischance. The fifth is September 1889, and there again we have no record, but it might possibly have been a French cable in September 1888, but that was in 55° W., which is a long distance outside the limits either of this earthquake or the former. Unfortunately, all this happened many years ago, and the records are not very complete. There may have been some other cause for the statement that the cables were broken as a result of earthquake. There is however nothing available to prove that earthquake was the cause.

Sir ALBERT KITSON: I should like to commence by thanking Professor Gregory for again favouring us with much interesting information. From what he has told us, so far as I have heard it, I am in entire agreement with his view of the matter: that the Cabot Strait was originally formed by a fault in the direction he indicated; similarly in the case of the Hudson and the Congo. Another case is a river in the Ivory Coast, where the hydrographic charts show a very deep abyss off the coast of the Gulf of Guinea. From some distance inland the northward extension of this line conforms generally to the course of the Komoe River, and suggests that the abyss and the course of the river were determined by a great fault. In the Gold Coast there are definite folds, the main axis of which are north-east—south-west.

It was not clear to me whether the pebbles found on the bottom were regarded

as ordinary glacial pebbles *in situ*, left by glaciers, or pebbles dropped by the melting of icebergs which came through the Strait of Belle Isle and Cabot Strait. It seems to me that they were probably from icebergs that melted as they drifted southward.

The last point is as to whether or not Professor Gregory has any evidence of any relative change in the coast-line of Newfoundland and Nova Scotia through the foundering of the portion affected. We know that is only an insignificant portion of the bed of the North Atlantic, but it is possible there may be something to show, and the area of subsidence may be very much larger than we suppose it to be from the evidence obtained since the soundings that have been made are those due to economic considerations only.

Professor GREGORY: I am much obliged to the three speakers for their remarks. In the first place, I am very grateful to Admiral Douglas for reporting the views of the Canadian Service. I did not anticipate that the changes would be very great. At the depths occurring in this part of the sea it would be very difficult to detect changes of 100 feet from a vessel by sounding, and as the disturbances of the San Francisco earthquake were only of a few feet, and those of the Tango earthquake less than 8 feet, a subsidence of only a few feet along this belt would be quite sufficient to cause all the earthquake disturbance; but that there have been subsidences does seem to have been shown by the evidence of the cable ships. Commander Robinson has referred to three cases: one of them, the formation of the gully, does represent a considerable depression and therefore probable subsidences in other places which would not be found by the soundings. I quite agree that one has to treat the comparison of modern soundings with old soundings with very great caution. The history of the North Atlantic reveals many cases of extraordinary difference of depths, as reported, between old and later soundings. Therefore we cannot attach too much importance to differences in the determinations of the cable ships and those marked on the Admiralty Charts. But there is one point that is significant: all the differences quoted indicate greater depth. If they were mere accidents one would have thought that a certain number of the differences would have been of shallowing and others of deepening. All the cases I know are in the same way. Such consistency in a large number of errors would appear to be improbable. It is more likely that there have been widespread changes in depth, but of amounts difficult to confirm by soundings.

Then in regard to Sir Albert Kitson's three questions. I was glad to hear that he, with his experience of the geology of the West African coast, regards both the Congo canyon and that off the Ivory Coast as tectonic and not due to erosion or sinking of an old river valley. Then he asked whether the boulders and stones had been dropped or deposited by icebergs. I think that is highly probable, but there is no absolute proof. The stones may have come from an old bed of boulder clay that has sunk below sea-level and forms the sea-floor there, or from a boulder clay formed *in situ* by material falling from melting icebergs. In reply to the third question, I am not aware of any direct change of depth or fall of the present coast-line in consequence of the recent earthquake.

I am grateful to Commander Robinson for his valuable information, and practically all the information which has guided me I have received from him. With regard to the 1884 earthquake, he has had the advantage of going through the records of the time which certainly give no confirmation of Milne's view, but Milne called attention in his paper to the importance of earthquakes on cable routes, and of a set of fractures which it is difficult to explain otherwise. I am grateful to Commander Robinson for his confirmation that there are these definite changes in level of the sea floor in at least three places.

The PRESIDENT: We are very grateful to you, Professor Gregory, for a most interesting paper and also for giving rise to the very interesting remarks that have been made. There is one earthquake of which you made no mention which, from a practical point of view, had a good deal to do with changing of depths, and that was the great earthquake at Messina. It happened that I was present at the earthquake of 1891, which was on a small scale, and also the great earthquake of 1908; in the latter case I arrived three days after the earthquake to succour the immense number of dying and wounded. On that occasion as many as 120,000 to 140,000 people were killed in five minutes. The wildest rumours went about as to what had occurred in the depths of the sea, and the depths are very great in the Straits of Messina. As a matter of fact, there had been practically no change at all. But it was of the greatest importance to the Navy to know what was likely to have happened. I was in command of a battleship at the time. Some interesting breakages occurred off Messina. The *Exmouth* was lying at anchor at about 30 or 40 fathoms. A slight earthquake occurred one night and her chain cable was broken in half. That cable was 2 feet 6 inches. She was lying about 12 shackles cable (about 140 or 150 yards) and halfway down, just where the cable lay on the ground, it was broken in half. You will realize from that the immense strains that there are. There is much to be investigated not only in this area but in many others. I know in South Africa people are firmly convinced that one of those great upheavals down towards the Antarctic Sea caused enormous quantities of fish to leave the water around South Africa for ten years, and then to come back again.

I was much relieved, and I think others were also, to hear what Commander Robinson said as to cables lying on the bottom. I have long wanted an authoritative opinion on the subject. With regard to echo-soundings not finding the bottom at great depth, while it is very necessary to know what the nature of the bottom is, from a seaman's point of view that is not of such great importance. But what is of importance from a nautical point of view and from this country's point of view, to my mind, is methods of sounding and generally a knowledge of the Atlantic and other oceans. Whether resounding is important from the cable point of view or not, personally, with all the deference which I pay to the Hydrographer, I hope he or his successors will be enabled to carry out some naval work of that scientific nature in the Atlantic; not leave it all to men like Dr. Meinesz. It is important that we should regain and retain our nautical scientific predominance in that as, I hope, we do in other matters.

Commander ROBINSON sends the following note supplementing his contribution to the discussion: Since making the statement about the 1884 earthquake I have obtained further information which considerably alters my opinion on the subject. It appears that the fourth case mentioned by Professor Milne was not a repetition of the third, as I then stated, but was actually a break in another cable which occurred approximately at the same time as the second and third cases. Also the three breaks were apparently more or less in a straight line, as stated by Professor Milne. There is still no direct evidence that any of the three breaks were due to earthquake, but I have been told by someone who joined the cable service about three years after the occurrence that the general impression then was that all three of these breaks had been caused by a "landslide."

In view of this information it seems probable that these three cases were due to earthquake.

THE LANGIA-ACHOLI MOUNTAIN REGION OF THE SUDAN–UGANDA BORDERLAND

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THE mountains of the Langia-Acholi group, culminating in the peak of Mount Kineti (10,456 feet), are the central and highest portion of a larger system occupying about 1000 square miles of the borderland between the Sudan and Uganda some 60 miles east of the Bahr el Jebel section of the river Nile. Up to the time of my visit these particular mountains seem never to have been fully described, and it is improbable that more than two or three travellers, apart from officials of the Sudan Government, have crossed them. In the position they occupy, even in the new edition of the 1 : 3,000,000 map of the Anglo-Egyptian Sudan, revised and reprinted at the Ordnance Survey Office, Southampton, in 1928, there will be found a space entirely blank save for the following note in the middle of it: "mass of high hills 5000 to 7000." As a surveyor in the service of the Sudan Government I carried out the surveys necessary to make a map of this interesting piece of topography during the early part of 1927.

The following account of the newly surveyed mountains is divided into two parts. The first treats of the general topography of the whole group (of which the Langia-Acholi Mountains are only a portion) and the immediate neighbourhood, of the people who inhabit it, and, very briefly, of the journeys which other travellers have made thereabouts. Occasional notes on geology, rainfall, flora, and fauna are also included. The second part is a description of a journey round and over the mountains actually surveyed by me.

The mountain system to which the newly surveyed area belongs lies between the parallels 3° 38′ N. and 4° 22′ N., and the meridians 32° 27′ E. and 33° 06′ E. With a few minor exceptions, where relatively unimportant outliers occur not strictly belonging to the main group, a belt of plain surrounds it. This plain, which is about 2000 feet above sea-level in the north near Torit, rises steadily to over 3500 feet over the Uganda border. Beyond that again there is a fall in the general level as the valley of that important river of North Uganda, the Assua, is approached. Across the plain in an east and west direction there is little change in level until the Nile Valley is reached in the west and Lake Rudolf in the east.

In shape the mountain group resembles an elongated horseshoe, much thickened near the toe, with its open end pointing towards the north-north-west; but to preserve the symmetry of the figure it is necessary to prolong the western side to include the Ifoto Range, which, strictly speaking, is a detached group, since it is separated from the larger range by relatively low country.

The length of the horseshoe from the toe to a point between the heel ends is roughly 63 miles, and the distance across where it is widest 22 miles. The thickened part near the toe represents the central mass and contains the highest peak, Mount Kineti. It is known, both to the Lango who live on the east side

and to the Acholi who dwell in the west, as the Langia Mountains.* Extending south from this central mass into Uganda are the Agorro Mountains, forming the toe of the horseshoe.

The north-eastern arm, the Imatong Mountains, is the best-known part of the whole system. Lobo (7065 feet) and Garia (8214 feet)—fine peaks with which no one who has stayed long at Torit could fail to be familiar—are in the Imatongs. At the extremity of this arm the mountains gradually diminish in height and width as they protrude into the extensive plains which surround the Government post of Torit. The last eminence, Lowudo, also called Imodongi, 7½ miles from Torit, is but a modest hill with a picturesque Latuka village on its lower slopes and a Government rest-house at its foot. The Ifoto Range, which forms the extended portion of the south-western arm, tails off into low hills in a manner somewhat similar to the Imatongs. It is the central massif and the heights of the south-western arm, which had not previously been surveyed and mapped, which I propose to describe in detail in the second part of this paper.

To the south-western heights many names are given by the natives who dwell near by, each section having its separate name. For the sake of convenience I propose to refer to them as a whole as the Acholi Mountains, since for the most part they are claimed by clans of the Acholi tribe. Exceptions are the Lomariti Mountains and the Lolibai Mountains belonging to the south-western arm, which are local names appearing on the accompanying map. These are instances where the names are not so restricted in their application as to include only a small area. The highest point in the Acholi Mountains is Kedong (7968 feet).

The geological specimens which were collected have been examined and classified by Mr. G. W. Grabham, Geologist to the Sudan Government. The rock from the summit of Kedong was identified as biotite gneiss, and that of the slopes of the same mountain as augen gneiss. Mr. Grabham considered that the summit of Kineti consisted of syenite, and Dr. John Ball, to whom I showed a specimen, was of the same opinion.

No trace of limestone or sandstone, or indeed any kind of sedimentary rock, was seen, although a careful look-out was kept. The long narrow dykes of basalt, whose characteristic feature is that they run in parallel straight lines, and which are numerous in the Nile Valley between Mongalla and Rejaf, gradually become fewer as one proceeds east, and have disappeared by the time the Acholi Mountains are reached. There must be occasional small intrusions of basalt however in the granites and gneisses of which the mountains are mainly composed, because basaltic boulders are sometimes seen lying in the beds of the mountain torrents.

The higher parts of the Langia, Agorro, and Acholi sections of the system are heavily forested, especially between the peaks, in the valleys, and wherever else the conditions have allowed soil to accumulate. The lower slopes are as a rule too steep and rocky for forest growth; but wherever a running stream emerges from the continuous forest which clothes the heights, a belt of magnificent trees follows it to the plains below.

*I understand from Lieut.-Colonel Lilley, D.S.O., District Commissioner, Latuka District, that with the Lango tribe the word "Langia" simply means "a group of mountains."

In marked contrast with the southern mountains, the Imatong and Ifoto sections of the group are almost bare of trees other than small acacias. The phenomenon is doubtless due to the rainfall, which in this region rapidly decreases as one proceeds north after crossing the Uganda border. The relative distribution of moss and lichen is also a clear indication of the rapid change which occurs from wet to comparatively dry conditions.

I need make little further mention of the flora, because as recently as the spring of 1929 Dr. Chipp of the Royal Botanic Gardens, Kew, travelled round the southern slopes of the Acholis and over the Langias, and we have since become indebted to him for a very interesting and learned account of the vegetation of that region.* He confirms what I had previously noted regarding the forests of these mountains when he states that "This is the first piece of Closed Equatorial Forest seen on the journey southward through Egypt and the Sudan, and is the northern limit in these parts of the great Cameroons–Congo forest which crosses the Rift Valley in places, penetrates the ravines, and pushes along the valleys of Uganda towards Abyssinia."†

Animal-life is plentiful in the mountains, but birds are few. There are gazelle of several kinds, bush pigs, and the Colobus monkey. Hyrax live amongst the rocks on the tops of some of the highest mountains.

The drainage system consists of many small semi-perennial rivers, each with innumerable affluents. During the dry season in January and February the northern, eastern, and most of the western streams are perennial only in their upper courses, and in no case does the water reach the Nile at that time of the year. The southern streams and the Ateppi would appear to be truly perennial however in years of normal rainfall.

All these rivers are themselves affluents of the Bahr el Jebel (Nile), with the exception of the Kineti and Koss, which are said to come to an end after running towards the north-north-east for about 100 miles in parallel courses, the former in the Badigeru Swamp and the latter in another swampy region in unexplored country farther east. Until recently I thought it probable that in the rainy season some of the waters of these rivers reached the Sobat; in any case that this applied to the Kineti, and that it reached the Sobat river by way of the Khor Veveno and the Pibor. The 1 : 250,000 map of the Sudan indicates this. During 1929, however, the Veveno was explored by surveyors of the Egyptian Irrigation Service from its junction with the Pibor in the north to a position in lat. 6° 12′, long. 32° 20′ in the south. By the time the southernmost point was reached they found the bed of the Khor to have diminished to such insignificance as to render it highly unlikely that it continued as far as the Badigeru Swamp some 60 miles beyond to the south-south-west, as was previously thought. Investigations to the south and east are being continued at the instigation of the Egyptian Irrigation Service, so that the real facts regarding the drainage of this hitherto unexplored region should soon be made known.

The principal streams which would be crossed on a journey round the mountains in a clockwise direction, starting in the north, are: The Iyodo, a large tributary of the Kineti, and the Kineti and Koss already referred to, which run

*"The Imatong Mountains, Sudan," *Kew Bulletin*, 1929, No. 6.

†See also "Forests and Plants of the Anglo-Egyptian Sudan," *G.J.*, 75, 1930, pp. 123–143.

in a northerly direction; the Okorak and Aringa, which, after draining parts of the Langia and Agorro Mountains, run south and join the Assua, an important Uganda tributary of the Bahr el Jebel; the Nyimur, which drains the mountains south-west of Mount Kineti, is another affluent of the Assua, and runs in a south-west direction; the Ateppi, which takes the water of the whole southern side of the Acholi Mountains and of the west side of the central massif, and joins the Assua not more than 6 miles from where the latter enters the Bahr el Jebel; the large streams, Ayi and Kimoro, which receive the drainage of the mountains west of Kedong and are the headwaters of the river Kit, which joins the Bahr el Jebel near Rejaf.

The most important of these rivers are the Ateppi and the Kineti. After heavy rains the latter is swollen to considerable dimensions and in places measures over 100 feet across and at least 10 feet in depth. In the dry season where the bottom is sandy it dwindles to a mere trickle but seldom dries up entirely. I believe that 1928, a year of unprecedented drought, was the first occasion on record when it actually dried up at Torit.

The Ateppi drains an area which has a more abundant rainfall and a less prolonged dry season. It is in consequence the larger of the two and is perennial for the whole of its course up to its junction with the river Assua. In the Farajok country in October its width has been estimated at 40 feet and its depth at 3 feet, but as its banks are swampy there, this could hardly have represented its true volume. Sir Samuel Baker mentions that when he crossed it south of old Obbo in May 1863 his horse had to swim.* When Emin Pasha forded it at no great distance from the Assua in November 1880, there was a rapid flow of water over a rocky bottom measuring 60 feet by 5 feet.† Baker reports that in March 1872 at the end of a long dry season it carried a stream of clear water at the point of its junction with the Assua.‡

At the present time the Latuka tribe occupy the level country west of the Ifoto Range, north of these hills, and the Imatong Mountains, east of the Imatongs, and also the Kineti valley. Between the Langia and the Dongotona Mountains and in Territania dwell the northern Lango. For the remainder of its perimeter the main mountain group is in Acholi country; and since it is mostly this portion which I have set out to describe, it seems appropriate to include a brief account of the Acholi tribe.

The language of the Acholi is similar to that of the Shilluk of the Upper Nile Province§ beyond the Sudd region, and philologists are accustomed to include in the same category the languages of the Dinka and Nuer of the same region, and those of the Lango‖ and Nilotic Kavirondo¶ (or Ja-Luo) of Uganda and Kenya Colony respectively. All belong to the Nilotic group. Emin Pasha and

*"The Albert N'yanza, Great Basin of the Nile, and Explorations of the Nile Sources.' Second edition, 1888, p. 205.

†'Emin Pasha in Central Africa.' Ed. by Prof. G. S. Schweinfurth, Prof. F. Ratzel, Dr. R. W. Felkin, and Dr. G. Hartlaub. Trans. by Mrs. R. W. Felkin, 1888, p. 262.

‡'Ismailia,' 2 vols, 1874, vol. 2, p. 70.

§Lord Raglan, 'The Lotuko Language,' p. 268.

‖"The Lango District, Uganda Protectorate," J. H. Driberg, *G.J.*, 58, 1921, p. 119.

¶*Encyclopaedia Britannica*, 11th edition, p. 145.

several other writers* have asserted that the Acholi people now living on either side of the Sudan–Uganda border migrated from the north some centuries ago, and recently Mr. Driberg† has given us a well-reasoned and detailed account of how this and other migrations originated and progressed. Apparently all the Nilotic tribes once occupied a territory lying about midway between the northern end of Lake Rudolf and the Bahr el Jebel. Its centre was roughly 45 miles east of the present administrative post of Torit. Owing to an invasion from the east of Semi-Hamitic tribes (which included the Latuka) during the sixteenth century, the Nilotics were in the course of time split up by degrees into the tribes with which we are familiar to-day. Some fled to the north and some to the south. The Acholi group is thought to have begun its exodus towards the end of the sixteenth century and to have made its way to the Bahr el Jebel near where Nimule now is. Finally, they settled down farther to the south and east, more or less in the districts where they are still to be found.

A few years ago a further movement of the Acholi on a small scale took place, but it was more a concentration in a part of the territory they already held than a migration. Reasons of health, not the attacks of stronger neighbours, dictated it.

As is well known, a most serious menace to the well-being of the natives in this and many other parts of Central Africa is the prevalence of sleeping sickness. The carrier of the disease, the tsetse fly (*Glossina palpalis*), is known to breed where shady trees overhang the banks of a river or stream, but it does not appear to thrive as a rule above an altitude of 4000 feet. In the valleys of the Ayi and Ateppi it would seem that the conditions are exactly those which the tsetse fly desires. The species which carries disease amongst animals (*Glossina morsitans*) was probably present in Sir Samuel Baker's time, and may have been responsible for the death of all his horses and donkeys‡ and also for the fact that cattle did not in those days do well with the Acholi.§ One would think that the *Palpalis* is a comparative new-comer, however, or else the tribe would surely have suffered more severely than it did in the past. The increase of sleeping sickness amongst the Sudan Acholi in recent years led the medical authorities to the conclusion that some drastic action was necessary for the preservation of the clans of the tribe in particular which dwelt on the banks of the Ayi and Ateppi. One method would have been to clear the courses of the rivers of trees and bush; but in a country of fast and luxuriant growth this was a task far beyond the capabilities of the people. The alternative remedy was to move them *en masse* from their villages and the lands which they had cultivated for more than three hundred years to a higher altitude where the tsetse fly is not found. This was the remedy actually decided upon. The Province administration in co-operation with the medical authorities after due consideration decided that the best site to which to move the clans involved was to the western and southern slopes of the Acholi Mountains. This plan was carried out.

*'Emin Pasha in Central Africa,' p. 150; C. W. Hobley, 'Eastern Uganda, an Ethnological Survey,' Anthrop. Inst. Occasional Papers, No. 1, London, 1902.

†J. H. Driberg, *op. cit.*, p. 120 and succeeding pages.

‡'The Albert N'yanza,' etc., p. 244.

§*Ibid.*, p. 238.

Mount Chufal or Lokiri, the Mount Asal of Baker

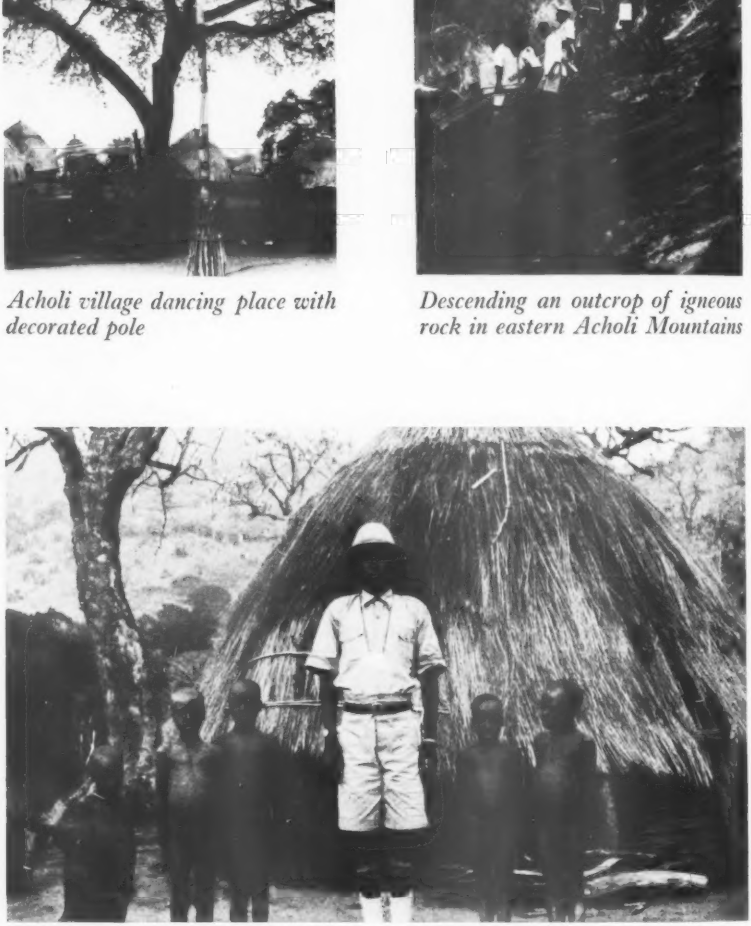
Mount Kedong from summit of Mount Gomia

Forest at 8000 feet, Langia Mountains: Mount Kineti in distance bearing south-east

UNIV. OF

Acholi village dancing place with decorated pole

Descending an outcrop of igneous rock in eastern Acholi Mountains



Aburri, principal chief of the Sudan Acholi, with some of his sons

Judging from what I saw in the course of my journey, the clans who were moved lost no time in adapting themselves to the new conditions. In the new settlements some of the old names are perpetuated. There is, for instance, a new Obbo, a new Farajok, and a new Palwar. One of the results of the movement was that the people found themselves very congested, particularly those from Farajok, who were the most numerous. Villages have had to be built very close together, and every inch of ground, be it good or bad, has had to be cultivated in order to produce sufficient grain to satisfy the wants of all. There is compensation, however, in the fact that the spread of the sickness has ceased. It is believed that no new cases have occurred.

So far reference has been made only to the three clans of the Sudan Acholi which were moved on account of sleeping sickness. These lived respectively in the Farajok country through which runs the river Ateppi, in the Obbo country north of Farajok, and at Palwar higher up the course of the Ateppi than Farajok. In addition there are three other clans, one under Chief Ongay, occupying the district of Panikwara (Magwe, where the chief lives, is about 8 miles south of Mount Lokiri, or Chufal), the other two, under Chiefs Odouro and Ongiro, dwelling at Lomariti and Lolibai respectively. Both the latter places are in the southern foothills of the Acholi Mountains. It is probable that these sub-tribes have been undisturbed in modern times, but as a result of the recent movement from the Ateppi valley the Lomariti and Lolibai people, previously isolated, now share the Acholi Mountains with the people of Palwar, Farajok and Obbo, whilst the Acholi of Panikwara have become separated from the remaining five clans by the stretch of country once known as Obbo and Farajok, but now uninhabited.

Both Sir Samuel Baker and Emin Pasha assign a definite position to the old Obbo, but Baker's position is about 6 miles south-south-east of that recorded by the latter traveller. Both positions must be too far east, because the longitudes given would place Obbo amongst the high mountains, though both have estimated its height at under 4000 feet. Baker's latitude, assuming an error in longitude, would place Obbo on the river Ayi, where it was when Emin paid his visit; but he, by his statement that it was on the Ayi,* proves his latitude to have been in error (by about 4 miles) as well as his longitude.

Although Emin considers the Obbo visited by him in 1881† to have been a different Obbo from that described by Baker in 1863, it is probable that if the village had been moved at all in the interval, it was only for a short distance up or down the Ayi. Such movement of their villages is customary with most African tribes, the object being always to be near to land which is not impoverished by over-cropping. Although Baker never speaks of crossing the Ayi on approaching or leaving Obbo, he refers to the neighbouring forest.‡ This was doubtless the forest of the Ayi, whose western boundary reaches as far as the old Obbo of the unrevised official maps of the present day. Both Baker and Emin always refer to the tribe as the Shuli (or Shooli), and both were hospitably received and well treated by them. Their manners and customs have changed very little in the sixty-five years which have elapsed

Op. cit., p. 255.
†*Ibid.*, p. 256.
‡"The Albert N yanza," etc., p. 208.

since Baker first visited Obbo, even as regards details. For example, the small whistle which was universally worn and in constant use in 1863 is still a noticeable feature, and it is still customary for unmarried girls to restrict their attire to three or four strings of small beads about 3 inches in length, suspended in front from a girdle also of beads. Katchiba, the old rain-making chief of the Acholi of Obbo, of whom Baker wrote such an amusing description, was undoubtedly a chief of unusual repute.* His fame is still a common topic for discussion, not only in his own tribe but with neighbouring tribes also. His grandson, Aburri, is still at the present time the leading chief of the Sudan Acholi.

From 1881, when Emin fled from the Sudan on account of circumstances arising out of the Mahdist rebellion, right down to 1904, I can find no trace of the publication of any further account of the mountains. Possibly other accounts will be brought to light when this paper has been read. A silence of twenty-three years came to an end in 1904, when the Society published a description of Major P. H. G. Powell-Cotton's journeys in Northern Uganda.† He evidently crossed the western arm of the range, following a similar route to that of Baker on his journey from Tirangole to Obbo in 1863.

Some twelve years later Captain R. H. Leeke, in a paper in the *Journal*, gave a most interesting description of the eastern part of the territory as he found it, presumably in 1915 or early 1916.‡ This traveller in the course of his journeys evidently made remarkably good use of his opportunities and collected a great store of information. Brief reference is made to the Imatong and Agorro Mountains, in which he makes it clear that he regards them as belonging to one system, as is indeed the case. His remark that "the Imatong (tribe) of the northern slopes of Mount Agoro . . . have not yet, I believe, been visited by a white man" is interesting in view of the account given in the next paper devoted to the district, which appeared in the *Journal* only seven months later.§ The author was Mr. H. Pellew-Wright, then a District Commissioner of Uganda. He describes an expedition which was undertaken, eight months after Captain Leeke had passed by, to the mountainous region to the south-west (Lolibai and the upper Ateppi valley), starting from a military post up in the Imatong Mountains not far from the peak of Lobo. It should be explained that at this period there was a considerable community of Latuka in the Imatongs, but as their inaccessibility presented difficulties when bringing them under effective administration, they were persuaded to move down to Logwi, Katire, and other settlements in the Kineti valley, where they are to be found to-day. It is not certain who the people were whom Captain Leeke described as the "Imatong of the northern slopes of Mount Agoro," but it is not unlikely that they were the Acholi of Lolibai, in which case they were found to be not only isolated and unknown to the white man but extremely wild and savage, judging from the adventures which befell the expedition when it reached their country. The Acholi at once attacked, and in the ensuing fight casualties were inflicted on both sides. The party, which was a small one consisting mainly of porters,

*"The Albert N'yanza,' etc., pp. 197–203.
†"A Journey through Northern Uganda," *G.J.*, 24, 1904, p. 56.
‡"The Northern Territories of the Uganda Protectorate," *G.J.*, 59, 1917, pp. 201–208.
§"The Imatong-Agora Mountains," *G.J.*, 60, 1917, pp. 283–287.

broke up and was obliged to retreat. Mr. Pellew-Wright went south and reached the Government post of Lokung, whilst the other two officers accompanying the expedition, Captain the Hon. F. R. Somerset and Captain R. H. Worsley, returned to the starting-point.

It was only a short time before these journeys took place that the adjustment of territory was made which gave part of the Lado Enclave to Uganda, and the Latuka country and adjoining areas to the Sudan. Captain Somerset, now Lord Raglan, became the first Commissioner of the Latuka District.

I think Mr. Pellew-Wright can safely claim to have been the first man, other than natives, to cross the mountains between the Langia and Acholi sections; and to him we are indebted for the first map that gives a good general idea of the physical features of what has, on closer investigation, proved to be the most considerable mountain group in the Southern Sudan.

I propose now to describe a journey round a part of the perimeter and over the central massif of the range. In shape the range has been likened to an elongated horseshoe much thickened at the toe. The route followed was from a point inside the horseshoe, about halfway along the eastern arm, across the inside, through the low part of the western arm, where the Ifoto Range is joined on, round the curve of the toe facing to the south-west, and thence straight over the central massif and down to the plains on the eastern side.

The starting-point was the Latuka village of Logwi on the western side of the Imatong Mountains, nestling amongst the foothills of the fine cone-like peak of Lobo. Logwi is about 23 miles from Torit, which can be reached by a road suitable for motor cars. It is a pretty spot, and from the Government rest-house a magnificent view is obtained across the Kineti river 1000 feet below to the northern slopes of the Acholi Mountains, which from here appear to rise like a wall out of the wide and comparatively flat valley which intervenes. The conspicuous light-coloured peak of Lakiding (7314 feet) to the left and the lower but no less prominent hill of Kakeiri (5551 feet) on the right appear like great bastions, whilst the mountain peaks between them recede somewhat towards the south-west, and thus seem slightly less imposing, although all are actually higher. Almost the central peak of this fine crescent is Kedong (7968 feet), the highest point in the Acholi mountains. It is the greater of two dome-like summits close together. Its lower slopes are clothed in very dark forest, and the last 300 feet or so in pale yellow grass, a combination which renders it strikingly conspicuous in certain conditions of light.

The Kineti river runs much closer to the Imatong than to the Acholi mountains, and from Logwi appears immediately below. Its course is marked by thick bush and trees, but occasional flashes of water can be seen through clearings. Its tributaries, which zigzag towards it from the arc of hills between Lakiding and Kakeiri, are very conspicuous. That side of the valley looks almost flat by contrast with the precipitous slopes which border it.

A steep rocky descent took me from Logwi to the foot of the Kineti, which is here a considerable stream, even in the dry season. Its water was crystal clear, though comparatively slow running. We crossed by means of a large tree which had conveniently fallen across the river at some time. On either side were

extensive fields of millet and other native corn, and the soil seemed good. Each patch had in its centre a wooden platform with a little roof of thatch, and each platform was occupied by a guard of youths of the Latuka tribe. The depredations of hosts of small birds in the millet fields cause great losses to cultivators in all parts of Central Africa, and it was the business of these watchers on the platforms to keep the robbers at bay by banging tins, shouting, and making harsh throat noises, and by throwing stones and shooting pellets of clay from the end of a flexible stick. With the latter they become very skilful and find the target as often as not. Rags and feathers strung on long lines were also used here to frighten away the birds.

As one proceeded west from the Kineti the country was gently undulating, and numbers of running streams, tributaries of the larger one, were crossed, the widest being the Ibobo. Almost everywhere there was a fair depth of soil supporting a luxuriant growth of bush and grass. Outcrops of granite and other igneous rocks were noticed from time to time. Some 5 miles from Logwi, as the crow flies, is the site of the old Latuka village of Nabara, now abandoned. It is on high ground commanding a fine view of the Imatong Mountains, now receding in the distance, and of the Acholi Mountains which rise precipitously out of the valley a short distance to the south. The peak of Kedong is from this point a dominating feature. From Nabara our route trended more to the north and passed close to Kakeiri, the north-east corner of the Acholi Mountains.

Beyond Kakeiri are the sites of two other abandoned Latuka villages, Loripa and Makorro. Although the land here is fertile and well watered by numerous affluents of the Iyodo (itself a tributary of the Kineti) it is somewhat remote from the administrative headquarters, and the inhabitants were therefore moved a few years ago for the same reason as those who used to live in the Imatong Mountains. In bygone days, when the Northern Sudan was the hunting-ground of slave raiders from the north, the terrified natives were wont to hide in such small and remote villages, whilst the more bold built fortified villages on convenient hilltops and even on the summits of high mountains like the Imatongs, and defied all efforts to dislodge them. Happily these melancholy days are now past, and few of the picturesque mountain villages remain. They must have been exceedingly inconvenient for their inhabitants, since there was usually no arable land anywhere near. Reaching the fields entailed a scramble down steep and rocky slopes, and probably a lengthy journey on the level. One can picture the heavy toil of the women, whose work it was to carry all the grain and usually all the water for the community from the plains below up to the villages in the heights.

About here we reached a track which may have been the one followed by Sir Samuel Baker in 1863 on his journey from Tirangole to Obbo, and many years later (1902) by Major P. H. G. Powell-Cotton.* It led over the ridge joining the Ifoto hills and the main group, but we encountered none of the difficult climbing described by Baker. After crossing the ridge we proceeded south, first through undulating park-like country, and then along the lower slopes of the mountains. Many streams of clear water were crossed; they were the feeders of the Kimoro, a branch of the Kit. This and another branch called the Ayi, which leaves the mountains about 10 miles farther south, wind

Op. cit.

through the northern plains of the Obbo of Baker, and meet at last near Magwe. The river in its lower reaches is known as the Kit and is of considerable size. Where it enters the Nile just south of Rejaf it attains a width of 200 yards. For the most part its bed is shallow and sandy, and it dries up in pools during the dry weather.

As we continued we noticed cultivation again for the first time since leaving the Kineti valley, all the intervening country being uninhabited. The fields belong to the people of Iyiri, where a somewhat unique (for this part of Africa) ethnological situation occurs, Iyiri being a large village of the Latuka tribe. There is no other settlement of that tribe within many miles, and the village is actually within recognized Acholi country. The inhabitants own allegiance to an Acholi chief, and may not, owing to sleeping sickness restrictions, have any intercourse with their tribesmen in the north. In spite of this they retain all the characteristics of their tribe and in no wise resemble the Acholi among whom they dwell.

Near Iyiri, approaching from the north, the scenery becomes increasingly attractive. The path, running across the lower slopes of the mountains, gives an extensive view of the grass and bush covered plains to the west, and of the mountains near Opari, misty blue in the far distance. Between Iyiri and the next village, which is the new Obbo (now spelled Awbaw), the running streams crossed at frequent intervals join the Ayi, a watercourse notable in its upper reaches for the abundance of forest trees which fill its valleys and those of all its affluents. Where the main stream reaches the plains, the forest broadens out fanlike. Towards the south it joins other forested areas, whilst to the north it extends nearly as far as the village of Iyiri. The western limit is about 3 miles from the base of the mountains. On a hot day after a long march it affords the weary traveller wonderful relief to plunge into its cool shade. The contrast strikes the imagination by reason of the fact that there is no parallel anywhere north of this, it being the outer edge of the closed forest mentioned by Dr. Chipp in his paper to which reference has already been made.

On emerging after a walk of some 2 miles through these pleasant leafy galleries, Awbaw was reached. An exceedingly steep path leads up to the rest-house, which occupies a small terrace-like area of level ground on the lower slopes of the mountains.

Halfway up the hill I was met by Aburri, grandson of the celebrated Katchiba of Baker's time and leading chief of the Acholi of the Sudan; he was accompanied by six other chiefs who had come to attend the *lokiko*, or native court. Aburri, unlike his grandfather whom Baker describes as a little man and something of a buffoon, is tall and dignified. In his general bearing he struck me at once as being much superior to his companions.

Awbaw proved a romantic and beautiful spot, meriting a brief description. The terrace upon which the rest-house stands is 4091 feet above sea-level; on three sides are high mountainous peaks, some of bare blackened granite, some completely forest covered, and some peculiarly dotted with compact clumps of trees which seem to spring abruptly out of the rocky surface. Occasionally a single tree, much taller than its fellows, will rise out of the centre of a clump, with a very curious effect. The verandah of the rest-house looks out over the plains towards the west; just below is the dark forest of the Ayi,

beyond is the comparatively flat country between the valleys of the Ayi and the Ateppi (the Obbo of Baker), and in the far distance nearly 20 miles away a range of rocky hills behind which is Opari, a Government post. A mountain torrent, a tributary of the Ayi, passes close to the rest-house on the south side. The deep gorge through which it flows is filled with great trees of dark foliage. On almost every one of the minor hills which lie between the rest-house and the mountains which enclose it on three sides there stands a village. To the east, about a quarter of a mile away, are the huts of Aburri.

In the immediate neighbourhood of the rest-house the scene was rendered more than usually attractive at the time of my visit by several species of acacia and some other trees which were in full flower. In one case, where the flowers were white and fluffy and grew in great profusion, the trees appeared to be covered with snow.

Sometimes, even in the dry season, storms gathered in the mountains and broke in the western plains; these were grand spectacles to witness from such a point of vantage as Awbaw. The torrential rain entirely blotted out the familiar scene and instead one saw great whirling clouds lit up by vivid and almost continuous flashes of lightning. The prolonged roll of thunder combined to produce an awe-inspiring effect.

In manners, customs, and dress the Nilotic Acholi differ in many ways from their Semi-Hamitic neighbours, the Latuka. It is usual for men to wear a small apron hung from the waistbelt, but the women and girls are entirely nude, or else wear a tiny apron about 4 inches square. Neither men nor women wear as many beads or other ornaments as is customary with the neighbouring tribe.

Both sexes are very merry, good-natured, and fond of music and dancing. A special feature is the whistle which every Acholi seems to own, no matter what his age and position may be. They vary from the little wooden whistle of the toddling child to the large and handsome one slung by a chain from the neck of a village headman. All day long their sounds, pleasantly mellowed by distance, echo between the steep slopes of the mountain-sides. The labours of his people are regulated from the village of Aburri by a big drum, whose boom and rattle float from village to village at certain times and are answered with similar sounds. Towards sunset, when work ceases, there is a more prolonged and ceremonial beating.

During the afternoon after my arrival I paid a visit to Aburri. He has about four huts of the ordinary round type on another terrace some 200 feet above the rest-house. Rather noticeable on approaching were his grain stores, different from those of the Bari and Latuka. They were built on a platform supported by poles, and in some other respects were similar to the stores of the Bari tribe; but instead of access being obtained by lifting off the roof, a large round hole, big enough to admit a person, had been made on the lee side just under the eaves. Later on I noticed another kind of grain store built with a lifting roof. In these quite a lot of attention was paid to exterior decoration. The walls were smoothly plastered with mud, and on the brown background human figures in all attitudes and animals of many kinds were quite skilfully painted in white. From a short pole at the apex of each roof flew a little flag, sometimes red and sometimes white.

Aburri is very well-mannered for a primitive African, and on this occasion

at his instigation four of his small sons advanced to meet me, came to attention and saluted smartly, while he himself came up in the rear, removing his hat. The photograph taken on this occasion (see Plate) is not without interest. Aburri is seen wearing his badge of office as chief of the native court. It consists of an oval of white metal on which is embossed the Rhinoceros, emblem of the Province of Mongalla. The four bigger boys are those just referred to; the two smaller ones are also his sons.

In the early morning of February 15 I set out from Awbaw to make a survey of the western end of the Acholi range. Proceeding eastward we climbed steadily for about two hours up the side of the ridge behind Aburri's village, passing through forests of magnificent trees and crossing several tributary streams of the Ayi and Iyodo, all running in deep ravines. My first objective was the peak of Gomia (6787 feet), which I had previously fixed approximately from back stations. It turned out to be rugged and boulder topped. The porters came up quite soon, and at this juncture a dispute arose, the impression having been gained that Gomia was my goal. Neither the guide nor the porters were at all willing to go on to Kedong, their argument being that it was not their mountain. It is the custom with most African tribes to divide the uninhabited parts of their country into zones, over which sections of the tribes have the hunting rights. Kedong was evidently outside the zone of my people from Awbaw. Despite this protest, supported by another that there was no path and that the forest was impenetrable, I held firmly to my plan to complete the journey, since to establish a trigonometrical station on Kedong was its main purpose.

As I suspected, there was a narrow path leading from Gomia in the direction of Kedong. In past years it was probably much more used than now, as it would be the most direct route from Awbaw to the Latuka village of Nabara, now abandoned. The forests were almost continuous and so dense in places as to exclude the light of day. Where the trees were fewer many beautiful flowers grew. Animal-life was little in evidence, though varieties of small mammals, gazelle and bush pigs are known to live there. All were well hidden save only the Colobus monkeys, which peered at us from their safe retreat amongst the treetops.

Having crossed several deep ravines, in which ran tributaries of the Iyodo, we at last reached the north-west shoulder of the mountain. The ridge rose upwards in a moderate incline towards the summit. The track passed on towards Nabara. As we drew away from it on a new course along the shoulder, the coarse grass of the clearing presently gave place to more forest and dense undergrowth through which we had to hack a way with slashers. It was evident that the mountain-top was an exceedingly wet place in the rainy season. Lichens thickly covered all the rocks, whilst moss and ferns were everywhere in evidence.

A species of parasitic fern grew on the trees almost to their topmost branches. For the last 500 yards the forest ceased, the rounded summit being almost entirely grass covered. Only a few groups of boulders composed of a very fine-grained biotite gneiss broke its dome-like symmetry. Of this rock all the higher part of the mountain appears to consist, but lower down the predominating rock is a coarse-grained augen gneiss. Haze resulting from the smoke of grass

fires here robbed me of a fine view of a mountain panorama, Mount Kineti being quite obscured. A strong wind, cold and piercing, blew persistently.

After spending two days in mapping in the vicinity of Kedong I occupied the peak called Kerifi, near which were found the sources of the Ayi (or Kit), the Iyodo, and the Lerua. The villages of Farajok and the Government rest-house there could be clearly seen from it.

The next journey was to Baili along the ridge which connects it with Gomia. The going was bad owing to bush and long grass, but from time to time wonderful views offered ample compensation for a little discomfort. From the summit of Baili I proceeded down its steep western slopes and round its south-western base, much seamed by the ceaseless erosion of running streams, back to the rest-house at Awbaw.

About this time the Acholi of Awbaw had an important dance held on a large area of level ground near the chief's house. It lasted day and night for three days. The performance consisted mainly of a jig to the accompaniment of drumming and clapping and blowing of horns and whistles. The noise at the time when I visited them was almost deafening. There was a bright moon, and quite a spectacular set was in progress, men and women having formed themselves into several concentric rings revolving in opposite directions. The dress of some of the men was very fantastic. A popular article of head-dress consisted of a cage of open basket-work made like a crown and surmounted by a plume of gaily coloured feathers. Most of them had their bodies painted with white or red earth in various designs. In marked contrast to the men were the women, who merely oiled their bodies and wore few ornaments and no clothes.

A characteristic drum-beating at an Acholi dance which one can hardly fail to notice is the following: Six rapid beats on a high-pitched drum, followed immediately by one beat of double length on a low drum. Then immediately two rapid beats on the high drum, and, without pause, five beats on the low drum, the sequence being repeated *ad infinitum*. The time averages about five beats per second. One operator uses both drums, which he beats with sticks.

As is often the case, the dance preceded a hunt on a large scale. The majority of Chief Aburri's young men and many of those of Payito and Oketch, to the number of several hundred in all, sallied forth into the uninhabited country between the Ateppi and the Ayi. The methods employed by the Acholi and other African natives in these hunts have been described so often by travellers and others that a further detailed account seems unnecessary here: suffice it to say that the game is forced into a small area by a ring of burning grass, and is then attacked by the hunters armed with spears and shields. Nets are also employed to make the escape of the smaller game more difficult. On this particular occasion no less than ten buffalo were included in the bag. No greater tribute could be paid to the bravery of the Acholi than to record this, as all experienced hunters agree that the buffalo is an extremely ferocious and dangerous beast at close quarters. I afterwards saw the horns of one of the slaughtered, and found them to measure 32 inches from tip to tip. The party did not come off unscathed in the encounter. Three were injured seriously and were attended to by the missionaries at Lerua, whilst many received less severe wounds, of which they took but little notice.

The Acholi take great care of their spears and shields. The latter are kept oiled and well polished, whilst the spears are invariably found to have a razor-like edge guarded by a sheath of leather.

Upon leaving Awbaw I continued my journey through the southern foothills of the Acholi Mountains. On the way to the next settlement, where Chief Payito lives, numerous small streams running out of the mountains towards first the Ayi and then the Lerua were crossed. Their beds are so deep and steep-sided that it is not unusual for steps to be cut to facilitate climbing out of them.

A mile or so from Payito's village a mission station has been established by Italian missionaries on the banks of the Lerua. There was a good attendance of Acholi youths in the mission school, where they were being taught to read and write in their own language, and also woodworking and other handicrafts.

Forest lines the Lerua valley, and this is one of the several places in the Acholi Mountains where indigenous coffee is found.* It is a source of considerable profit to the natives, who collect the berries when they have ripened and fallen to the ground, and sell them to traders.

Just over the Lerua is the new Farajok, consisting of many groups of huts wherein Payito's people live. This is the largest section of the Acholi tribe in the Sudan. They used to live in the Farajok country north of the Ateppi, which is shown on all the old maps and which from all accounts was a land of plenty. Their present habitat can scarcely be so described. It is situated well up in the foothills, where there is much rock, very little soil, and hardly any level ground. No crops were growing at the time of my visit, but it could be seen that every inch of space capable of growing a crop had been cultivated during the rains. Slopes so steep that they could only be climbed with difficulty had been brought into use. Along the tops of all the ridges and on top of every hillock was a village.

The Acholi here build their huts with double walls of stout bush wood filled up in between with mud. The roofs, of beehive shape, are indifferently thatched. An unusual number of square huts were noticed. The chief himself had one of large size, and it is the custom to build small ones in each village for the little boys to sleep in. They lie all together in a large bunk made of a lattice-work of twigs which occupies more than half the width of the hut and is raised about 3 feet from the ground. Apparently access to the bunk is gained from the inner end, as the side away from the wall is high, almost reaching to the roof. There is a small peephole in this side near the hut door. The hut I inspected was very clean.

In every village there were numbers of miniature huts, some on the ground and some on poles. These are intended as resting-places for the spirits of ancestors. Another conspicuous feature was the dancing-places, in the centre of which stood a large pole much decorated with crude carvings and paint of various bright colours. The villages are not fenced in. Grain is stored in small huts raised on posts as a protection from pests; some have walls of basket-work with a plaster of mud on the outside. Lubia is made up into torpedo-shaped grass-encased bundles, each one being suspended from the end of a tall pole stuck in the ground.

Leaving Farajok, I continued my journey eastwards by a very good contour

*See Chipp, *Kew Bulletin*, 1929, No. 6, pp. 180 and 182.

path round the side of Loyoro. The view towards the south, across the valley of the Ateppi and beyond to the two mountains Aggu and Akwero, was extremely fine. The Jama proved to be a noble stream even at this season of the year. Soon after we crossed it the rest-house at Palwar came into view. Standing as it does on a hilltop it is most conspicuous.

The chief, Oketch, met me. He is a quiet and dignified man with a somewhat melancholy demeanour. The general altitude of his new territory, which, like the old, is named Palwar, is over 4000 feet. It is said to be very wet and cold in the rainy season, and some of the cereals dear to the hearts of the Acholi do not thrive. Sim-sim, rich in oil, will not grow at all, a circumstance which is regarded as a real hardship since the oil when obtainable is much used for anointing the body. No native feels really well turned out unless his black body is made lustrous by this means!

An ornament favoured by the Acholi hereabouts is a heavy bracelet of copper, sometimes as much as half an inch in diameter. It has to be put on by a blacksmith and removed by one too, if necessary. Fine chain with twisted links is largely used for decorating the person.

The country east of Palwar is very attractive. The slopes of the higher mountains no longer extend continuously to the plains, but are broken at an altitude of about 4500 feet by a shelf of comparatively level country edged towards the south with low hills affording protection from the strong wet winds which in the rainy season sweep over the land from beyond the Ateppi and the borders of Uganda. To the north the mountains Ajago and Obeli, belonging to the main range, rise steeply. A wide and well-kept path gently undulates down towards the many bubbling streams which converge and become the river Mashi (an affluent of the Ateppi), and upwards to stretches of level and park-like country lying in between. Sturdy acacias and occasionally larger trees more leafy and giving a generous shade are dotted about, and everywhere are flowers and grass, green even at this season of the year. The whole shows signs of having been cultivated, and the soil looked very good. The spot appeared to be ideal for coffee growing.

Presently another important tributary of the Ateppi, the Ngnolobot, was crossed. It drains a large area of the higher mountains and must swell to imposing dimensions in the rainy season. A stiff climb out of the valley of the Ngnolobot brought us to the rest-house at Lomariti, surrounded by the many small villages of the people of Chief Odouro. From this point the valley of the main branch of the Ngnolobot dominates the scene in the direction from which we came. It separates the mountain of Obeli (or Ewala, as it is called in Lomariti), lying to the south, and a series of still higher peaks to the north. The valley is deep and steep sided, and as the mountains on either side throw out no spurs into it, one looks straight up to what seems to be its very source. The whole being completely filled with a wide belt of dense forest of a very dark hue, the effect in the afternoon, when the sun no longer penetrates its depths, is strikingly sombre. From Lomariti rest-house Aggu and Akwero are also clearly visible once again.

Unlike their western neighbours, Odouro's people have probably been settled at Lomariti for a long time. They and the Lolibai Acholi, who live nearer Mount Kineti, are presumably those referred to on the official map of

the country in use at the time of my visit as " purely hill people who speak a Latuka dialect." As "hill people" they are quite rightly described, but they belong definitely to the Acholi tribe, whose language is quite different from that of the Latuka. The misapprehension that the Lomariti and Lolibai Acholi speak a Latuka dialect may possibly be attributed to the fact that they are able to converse with the Latuka through having learned a dialect of their language from the Lango of Logoforok, with whom they are on very friendly terms. These Lango, who seem to belong to the same race as the Lango of Uganda from whom they are separated by a wide belt of Acholi country, do indeed speak a Latuka dialect.*

Lomariti lies amongst the foothills of the main mountain mass. The villages are very scattered and usually occupy commanding situations on hilltops. The land is well watered by running streams which reach the Ateppi by way of the Teba, and seemed fertile for the most part.

Beyond Lomariti the track crosses the Teba and then winds upwards, passing over smooth patches of bare rock which afford only a precarious foothold. Eight hundred feet above the Teba crossing is the pass between the two hills Lakwinya and Laiwaiya. The latter is remarkable in that it is entirely covered with bamboo. The phenomenon is all the more striking because none of the other hills have much bamboo growing upon them. Just beyond the northern end of Laiwaiya the last of the villages of Odouro is passed, and the track follows the contour along the side of a deep wide valley, enclosed by mountains except to the north-east, where a tributary of the Teba, which drains it, effects its escape through a gap between Lakwinya and Loberika. A little farther on the route leads along the top of a narrow ridge dividing the valley just described from the main valley of the upper Ateppi. As one looks back, the bamboo-clad Laiwaiya now has the appearance of an immense inverted broom. On the right is the Ateppi valley itself, of great width and known here as the Kolomina. It is more than 1000 feet beneath the saddle, yet an occasional flash of water can be seen. In sharp contrast to the sombreness of the upland forest, the vale of the Kolomina is variegated in light shades of brown and green. On the far side can just be discerned the northern peaks of the Agorro mountains, including Goula, over which passes the frontier of Uganda.

After a march of some 10 miles over hill and dale amid scenes of this description, we came to the rest-house at Issore. Issore is in the Lolibai country, the most remote of the Acholi settlements. It was here that Mr. Pellew-Wright's expedition was attacked by the inhabitants only eleven years previously. He himself was slightly wounded and so were some of his followers. Several were said to have been killed on the enemies' side. A rotund little man who hurried forward to greet me with a pleasant smile turned out to be Ongiro, the chief. He afterwards told me with no little pride that he was one of the assailants, whilst several of his people displayed scars of the wounds they had received in the affray.

I made a short stay in the Lolibai country in order to carry out a plane-table survey of the mountains which surround it. The climate at the time of my visit was cool and pleasant. No rain to speak of had fallen for some time, but the sunlight was seldom strong, through the sky being thinly overcast. The people

*Alban, 'Sudan Notes and Records,' vol. 5 of 1922, p. 49.

seemed happy and well fed. They possess a few cattle, sheep, and goats, and their plots of telebone, dukhn, and sweet potatoes were in a flourishing condition.

All preparations having been made, I now set out to cross over the main mountain group and make the ascent of Kineti on the way. The track from Issore onwards is narrow and often ill defined. It follows a northern tributary of the Upper Ateppi for a few miles, the valley floor rising steeply; but the real ascent begins when, bending towards the east, the track winds up the precipitous valley side.

The resources of Ongiro's small community were somewhat severely taxed in providing a sufficient number of porters to carry all my instruments and camp equipment, and the provisions of my party over the mountains. The Chief Ongiro, who accompanied us, is an enthusiastic hunter. Every few yards he would stop to examine animal tracks quite invisible to me. At frequent intervals he would stoop over some broken twigs or crushed leaves and mutter confidentially the word *lahm* (Arabic—meat), signifying thereby that a gazelle or bush pig had passed that way not long before.

To carry some of my heavy boxes and my tent on the head up the steep sides of the mountains was no small task, but the Acholi were amazingly cheerful over it and carried on an incessant chatter to the accompaniment of piping whistles. Buxom women, bearing bags of millet flour, and often a baby too, clambered up the rocky path beside their husbands, and not infrequently relieved them of their burdens whilst they had a smoke from a capacious and well-seasoned Acholi pipe. The babies were in no wise put out and hardly ever cried, but slept peacefully on their mothers' backs, seemingly oblivious of the jolting and of the noise and bustle. The Acholi baby rides astride and is supported on his mother's back by a large square of leather. The bottom edge encircles the mother's waist, the two corners being tied in front. The top edge comes to within a few inches of the baby's head, and is secured by the two corners being also tied in front above the breasts. When the sun is hot, the little one is crowned with a helmet in the shape of a basin made of gourd shell. Even at this altitude the clothing of all was of the scantiest.

After a climb of nearly 3000 feet we reached the watershed between the Kineti and the Ateppi rivers. The latter enters the Nile 60 miles away to the west-south-west, whilst the former runs into the northern swamps over 100 miles distant. A feature worthy of note at this point is the manner in which the crest of the divide meanders round the heads of alternate tributaries of the Ateppi and Kineti. Here the track forks, one branch leading down to Katire in the Kineti valley, and the other eastward past Kineti peak and Kipia and on to Logoforok. Our path was the latter. Forest still clothed the mountains and filled the valleys, but at this altitude the trees no longer grew to so great a size. There is evidence of heavy rainfall in the prolific growth of lichens and parasitic ferns which in sheltered places almost hide the trees from view. Tree-ferns and maidenhair ferns were now seen for the first time, and amongst the undergrowth which edged the forest glades a bush like the blackberry, but bearing a fruit which is red when ripe, was very common.*

Seven hours after leaving Issore we reached an open space on the northern

**Rubus Steudneri* Schw., 61, or mountain blackberry. See Chipp, *Kew Bulletin*, 1929, No. 6, p. 183.

slopes of Kineti, where I decided to camp. We had climbed 4000 feet, and for the first time I had the satisfaction of looking down on Garia—the striking craggy mountain which is the highest of the Imatongs. The weather was clear and bright, but the air cold, especially in places exposed to the wind. As night fell, all occupied themselves in making huge camp fires. I was interested to see two old men producing fire with sticks. One stick is laid on the head of a small native axe and into a notch of it the second is inserted. The latter is tapered towards the upper end so that when it is revolved between the hands (which are vigorously spat upon at frequent intervals) downward pressure can be applied without the hands slipping too readily. In the operation a powder is ground by the revolving stick, and this, after six or eight attempts, begins to smoke and finally to smoulder. As soon as it smouldered it was put into a pipe, presumably for the purpose of lighting tobacco only. It would no doubt have lit dry grass readily if blown upon. The pipes were easily lighted with it. The sticks were evidently of special wood, as they were carefully put away in a bag after use. During the process one old man relieved the other at half time, indicating that a good deal of exertion was required.

In spite of the promising appearance of the evening before, the morning broke with mist and rain which had not abated by 8 a.m., when I decided to make an ascent of Kineti. The climb was not difficult. Trees and bush were not left behind until within about 500 feet of the summit. An ice-cold white mist obscured everything beyond 100 yards, and on the summit half a gale of wind blew. We were all glad to seek shelter under the lee of some overhanging rocks.

The mist persisted until noon. Then, when it rolled away, a truly magnificent view was unfolded. Every feature of the landscape stood out clear cut, and all the matchless colours of nature were intensified in the rain-washed air. Towards the east, about 4 miles away and some 2000 feet below, the lonely rest-house of Kipia stood in the midst of a unique patchwork of green, brown, and black. Viewed from a height the country round about this point had the appearance of a smooth rolling grassy plateau, dotted here and there with small and compact clumps of large forest trees. The patchwork effect was due to the grass having been set on fire from time to time.

This strikingly clear view came to an abrupt end where the edge of the escarpment overlooked the eastern plains 5000 feet below; but in the far distance could be discerned the fantastic silhouettes of the Dongotona Range and others beyond, growing fainter with distance until no longer distinguishable from the low clouds which touched the horizon. In the north were the Imatong Mountains, now dwarfed by the superior height of Kineti. To the south one also looked down on the numerous peaks which belong to the Agorro group, the majority being on the Uganda side of the border. Issore, from whence we had come, could be made out as a mere speck far below, and in the same direction rose hill after hill of the Acholi range as far as Kedong. The valley of the Ateppi pursued its way as far as the eye could see, and to the south of it, in comparative isolation, stood Aggu and Akwero.

It was hardly necessary to set up and level my theodolite to prove that Kineti dominated all. Territenia, a long way to the south-east, appeared to the eye a possible rival, but the arc of the instrument and a few calculations for curvature

and refraction soon showed all to be well below us. We stood on the highest peak in this part of Africa and, so far as our records can show, the highest in the Anglo-Egyptian Sudan. Later on my computations showed Ichomo (9932 feet) to be next in height in the range here described. It is a prominent feature of the Langia group about 9½ miles east-south-east of Kineti and within a mile of the Uganda border. It is thickly covered with forest even to its summit. Just south of it is Mount Langia (Modole), through which the frontier actually passes. It is one of the few peaks of the range shown on the old map, where it is wrongly credited with a height of 10,120 feet. As the whole group, including Kineti, is known as Langia to the Langu people of Logoforok, there seems little doubt that the group was meant in former maps, and not the single peak of that name, which is only 9352 feet.

Weathering through the long ages has reduced the summit of Kineti to a gently curved dome of large area, whose symmetry is broken only by a single buttress jutting out on the north side. Except for three small piles of boulders composed of syenite, the summit was entirely covered with coarse grass and flowering plants. Moss and lichens clung thickly to the rocks. Almost the last bush to be seen when making the ascent was a bramble of mountain blackberry with half-ripe fruit on it. The temperature at midday was 45°, and a barometer registered 19·20 inches.

On the way back to camp I noticed thistles and maidenhair ferns growing in the forest. During the night the temperature fell to 42° in camp, but the weather continued fine, and next morning an early start was made and Kipia reached before noon. The rest-house here was built by the District Commissioner of Torit as a halfway camp for those officials who in the course of their duties sometimes journey between Logoforok and Katire or Issore. As the mountain grass is of a very short variety, all that was needed for thatching had to be carried up from the plains below. It is near the edge of a saucer-like plateau 8786 feet above sea-level, and the surroundings are of rare grandeur. Between it and Mount Kineti are the sources both of the Kineti river and the Malumas (which afterwards becomes the Koss). These two rivers, with sources actually within a few yards of each other, first run in opposite directions, but subsequently follow parallel courses, one east of the Imatongs and the other west. In the Latuka plains north of Torit they almost meet, but so far as is known they reach the swamp country beyond independently.

The track just east of Kipia rose over 500 feet, until, skirting the shoulder of Mount Otolo (9458 feet), it reached its greatest elevation. Otolo lies between two affluents of the Koss river, one of which runs north and joins the main river a few miles beyond Logire, beside the Logoforok–Torit road, whilst the other flows south into that part of the upper course of the Koss known as the Malumas. High country was traversed for a further 2 or 3 miles until, when abreast the light-coloured rocky peak of Ahima, the descent began. It is a descent of 6000 feet in 5 miles. In places the path is so steep and rocks and stones lie so near the angle of rest that it required the exercise of some skill in balancing to keep one's feet. A small avalanche of debris was from time to time set in motion, and when this happened, the vanguard of the party was liable to receive some hard knocks from flying fragments.

Some 1500 feet down the descent ceased for a while and the path followed

the contour round the head of a combe which, after the Malumas ravine, is perhaps the most striking feature of these mountains. Immediately opposite the point where it debouches at right angles into the still deeper valley of the Malumas, the immensely dark, tree-clad side of Ichomo rises sheer and unbroken to its summit 4000 feet above.

The slopes of Ahima form a precipitous declivity for 2000 feet, and in every little crease in this great wall of rock a stream of water takes a plunge into the depths below. This water finds its way into a tributary of the Malumas which runs through the centre of the combe. The track crosses it quite near its source, where it is a mere trickle, and just above where it falls, like its companions, down the cliff-side. Once the circuit of the combe was made, the descent was steep and continuous. On the lower slopes moss and lichen, signs of a heavy rainfall, disappeared, and large forest trees gave place to the familiar acacias of the lowlands; also the temperature rose steadily. Fine views were obtained across the dry sunbaked eastern plains, out of which rose at intervals range after range of mountains, beginning with the Dongotona, at whose foot on the south-west some miles away could be clearly made out the Government post and village of Ikoto. For the last 2000 feet a course was steered for Logoforok, which seemed close at hand when in reality still far away. Over one's right shoulder glimpses could be had, through clearings in the trees and bush, of the Malumas ravine, deeply cut between the two mountains Ichomo and Ahima.

Logoforok rest-house was reached and the journey ended late in the afternoon. Looking back on the mountains from which we had come, the Malumas valley was still the central and predominant feature. To the north and south of this prodigious cleft rose the cliffs of the main escarpment to some 5000 feet above the surrounding country. Detritus, the result of long ages of erosion, lay piled against them in heaps so large that quite a third of them, from the base upwards, was hidden from view. At the point where the northern cliff turns to a more westerly direction and is lost from view, is the conspicuous needle-like pinnacle of Logire. Our Acholi quickly mingled with their Lango friends, who that night gave a dance in their honour.

I cannot conclude this account without recording my most grateful acknowledgment of all the help and encouragement I received from Mr. A. W. Skrine, late Governor of Mongalla Province; Major R. G. C. Brock, O.B.E., late Deputy-Governor; and Lieut.-Colonel H. A. Lilley, D.S.O., and Major R. B. Black, D.S.O., District Commissioners of Torit and Opari respectively during the time that this survey was being organized and carried out.

AN UNPLACED ATLAS OF AUGUSTIN ROUSSIN

THROUGH the courtesy of the Explorers' Club of New York we have received photostat copies of the sheets of a MS. atlas drawn at Marseilles by Augustin Roussin, extracts from which we now reproduce by that Club's permission, given through its Secretary, Mr. F. A. Blossom. The remarkable point about these sheets is that they are themselves taken from another photostat set, which has been received by the Explorers' Club with no hint of the sender's name and no clue to the place in which the original atlas is preserved. It is hoped that the present reproductions of portions of two of the charts may help to solve these points and also elicit information as to the maker of the atlas, who seems to have come of a family whose work is imperfectly known and who cannot in any case have stood in the front rank of the chart-makers of his time.

The present atlas was drawn at Marseilles, as appears from the signature "Augustin Roussin m'a faict dans la ville de Marseille," which appears on the first of the sections now reproduced, and there is no doubt that the family was French, though two of their known atlases were actually made at Venice. One of these was briefly described so far back as 1862 by D. P. Matković in an article on old sea charts preserved in Viennese libraries (*Mitt. Geogr. Gesells. Wien*, Vol. 6, 1862, pp. 79–107). It was then owned by Cav. E. Cicogna, and is described (*op. cit.*, p. 105) as a nautical atlas of four parchment sheets delineating the coast lands of Europe. It was undated, but one of the sheets bore the inscription "Facta (*sic*) Venise par J. F. Roussin." It was carefully and clearly drawn, and ornamented with gold and colours. Matković regarded it as based on good Italian models, and as probably made about the middle of the sixteenth century. But unless there were two draughtsmen of the same name and initials, both settled at Venice, this date would seem much too early, for, according to Uzielli and Amat ('Studi Biografici e Bibliografici,' Vol. 2, 1882, p. 275), an atlas of similar character, in five sheets, in the Museo Civico at Venice, bears the inscription "Faict à Venise par J. F. Roussin 1663." And that this is the true date is borne out by the existence, in the Bibliothèque Nationale in Paris, of a portolan of the Mediterranean, also by J. F. Roussin, dated 1669, as is mentioned by Nordenskiöld ('Periplus,' p. 69 b).

We are unable to say what was the relationship of this J. F. Roussin to the Augustin with whom we are now concerned. The only other work of the latter generally known is an atlas of three sheets formerly owned by Nordenskiöld ('Periplus,' p. 68 a). The date in this shows signs of alteration, but was thought by its owner to be 1590. Two of the sheets formed a "normal portolano" and were adorned with pictures of sovereigns in full array and with animal pictures, while the third was a special chart of the Archipelago. As this too was made at Marseilles the identity of its maker with the man who drew the originals of the Explorers' Club photostats can hardly be doubted, and these latter may also be ascribed to the second half of the sixteenth century. American students who have seen the sheets consider them to belong to the class of French maps of the Desceliers school, though it seems questionable whether the influence of this would have been felt so far away as Marseilles. Anyhow, the atlas cannot have been drawn much before 1550 (possibly a good deal after) as is proved by the

ROUSSINE
Marseille
EVR

RIO AMASONES
BRASIL
GRADVS LATITV

representation of the Amazon in conventional zigzags, as in the so-called Cabot map of 1544 and the somewhat later Portuguese charts of Gutierrez and Diego Homem. The date might perhaps be brought within narrower limits by a detailed study of the nomenclature, which in parts, *e.g.* on the west coast of South America, is unusually full.

Comparatively few examples of the work of Marseilles cartographers of the sixteenth century appear to be known. The Vadianus Library at St. Gallen possesses a chart by one Caulet (?) thought to be of date *c.* 1600, and there is an atlas of 1642 at Lyon by Pierre Collin of St. Malo (De la Roncière: 'Les Portulans de la Bibliothèque de Lyon,' 1929). Members of the Italian family of Oliva (or Olives) seem also to have been settled as map makers at Marseilles in the early or mid-seventeenth century, as is pointed out by Mr. R.D. Oldham in the note printed in the present number, p. 204. They appear to have been rather copyists than men of originality, and we may perhaps put down the Roussins in the same class. The style of Augustin's maps, particularly as seen in the ornamental borders and the decorative scales of miles, is attractive, and the atlas was probably made for some high personage. A sheet accompanying the maps bears a large coat of arms which has been identified in America as that of Emanuele Filberto, Duke of Savoy (born 1528, died 1580), and the presumption is that the atlas was his property, though Mr. Blossom is careful to say that there is no positive proof that the sheet bearing the arms formed part of the original atlas. A smaller coat on the map itself is indistinct in the photostat, and has not been identified. Possibly it is a later addition.

Although the atlas is not of the highest importance, students would be glad to have news of its present whereabouts. E. H.

SOME RECENT DECISIONS OF THE P.C.G.N.

MAJOR-GENERAL LORD EDWARD GLEICHEN,
K.C.V.O., C.B., C.M.G., D.S.O., Chairman, P.C.G.N.

TWO decisions adopted by the Permanent Committee on Geographical Names at their meeting of November 19 last were of so much interest that I think a short account of them in the *Journal* would be advisable.

The first was with reference to the new system of the romanization of Japanese. As has been previously pointed out (*v.* especially *G.J.*, October 1928, vol. 72, pp. 360–362), this system, invented by a society entitled the Nippon Romazikwai, has up till now met with somewhat scant acceptance. It aims at a scientifically correct transliteration of Japanese, but thereby upsets considerably the more phonetically correct Hepburn system, which has for over fifty years been accepted by both Japanese and British as quite sufficiently accurate for all practical purposes. A few examples of the variation in spelling have been given in *G.J.* (*loc. cit.*), including such well-known names as Fujisan (popularly Fujiyama), Tsushima, Chichibu, Shimizu, which become Huzisan, Tusima, Titibu, Simidu in the Nippon Romazikwai orthography. Other

examples are Karafuto, Honshū, Shikoku, Chosen, Chiba, Shizuoka, which the Nippon Romazikwai turns into Karahuto, Honsyû, Sikoku, Tyôsen, Tiba, Siduoka. As will be seen by these examples, not only is the spelling a good deal altered, but the initial letter may often be replaced by another, and so the word will be difficult to find in indexes, catalogues, etc.

The question as to whether the P.C.G.N. should adopt the new romanization or not arose some time ago. The chief difficulty in settling it is due to the fact that the new system has not yet been definitely sanctioned for universal use by the Japanese Government. The following departments have adopted it: the Land Survey Department of the Imperial Japanese Army and the Hydrographic Department of the Navy (the two chief official publishers of maps), the Imperial Earthquake Investigation Committee, the Central Meteorological Observatory, and some Public Libraries for the purpose of catalogues. On the other hand, the Post Office, the Geological Survey, the Department of Railways, the Foreign Office and Diplomatic Corps, the Home Office, the Ministry of Finance, and the National Research Council have not adopted it. Nor have the newspapers. The Education Department has come to no decision, but has appointed a Committee to report upon the matter. Questions to the Japanese Embassy in London have elicited only the response that the Government has not yet given a ruling; it was however recently hinted that there was some likelihood of the new system being standardized on account of its being favoured by most of the professors at the Imperial Universities. But it may be noted that in Japan a counter-society called the Romaji-Hirome-Kai, whose officers are men of high intellectual standing, advocates a reformed Hepburn system (which was ultimately adopted by Hepburn himself).

The matter was brought to a head by the British Admiralty, in view of Japanese official charts being issued with the new orthography, referring the matter to the P.C.G.N. After a lengthy discussion it was unanimously agreed that the new Nippon Romazikwai system should not be adopted for the present. It is understood that spellings on Admiralty charts will not be altered but that a glossary of the old and new spellings will be printed at the end of the Sailing Directions that deal with the coasts concerned.

It may be added that the School of Oriental Studies has not adopted the Romazikwai system and that the Japan Society contemplates it with horror. It now remains to be seen whether the Japanese Government will order the universal adoption of a single system of romanization in Japan and so assist foreigners to come to a definite decision.

The second question was whether the P.C.G.N. should adopt the new Turkish spellings in Latin characters. So far as we know, no official Turkish map with the new orthography has yet been issued; a certain unofficial map does not entirely agree with the Official List of Administrative Divisions published by the Ministry of the Interior. But in the Turkish case, different from the Japanese, the new orthography has been universally adopted in official departments. Therefore after a good deal of discussion as to the desirability of retaining a number of well-known names in their old form, we felt ourselves bound to accept it, practically *in toto*.

In several respects however it is extraordinarily inconvenient. Chief among the objections to it is the Turkish representation of our *j* sound, not by

j, but by *c*: *e.g.* Erzinjan becomes Erzincan. Our *ch* and *sh* sounds are represented by *ç* and *ş*, and an awkward letter *ı* (without a dot) has been invented for the neutral vowel (or sound of *e* in French *je*). There is also a form of *g* written *ğ* to show when it is mute or to be pronounced as *-i* in the second half of diphthongs. These symbols do not hamper the writer nor the draughtsman, but present considerable difficulty to the printer and the typist who, not having the requisite letters on their machines, have to use the ordinary *c*, *s*, *i*, and *g*. Some geographical examples are Çatalca, Eskişehir, Sıvas, Ereğli, hitherto generally spelled by English writers, Chatalja, Eski Shehr, Sivas, Eregli. (For further particulars of the new Turkish alphabet see *G.J.*, July 1929, vol. 74, pp. 72–74.)

This brings us to another aspect of the P.C.G.N.'s work. For though in Turkish place-names the substitution of *c*, *s*, *i*, and *g* for *ç*, *ş*, *ı*, and *ğ* would be of small import, and letters with the address so spelled would in all probability be delivered, still the difficulty remains in writing other languages. Now certain leading map-publishers and others have complained that the P.C.G.N. uses too many diacritical marks and that they have not the necessary letters (for indexes, gazetteers, etc.) in their founts nor on their typewriters. At the same time they point out that "conventional" names are going out of fashion, especially in the United States, where native European names, *e.g.* Milano, München, Bruxelles, are coming much more into use; and they urge us also to adopt these. While the P.C.G.N. can sympathize with either of these points of view taken separately, they will be found upon examination to be practically incompatible. When the Rules for Spelling, termed the R.G.S. II System, were drawn up eleven years ago, by the first rule we accepted, with a certain number of "conventional" exceptions, native place-names officially written in Latin characters; and by the third rule we accepted accents and diacritical marks employed thereon. Those marks are indispensable, for they radically alter the sound of a letter, and, if they are left out, both the spelling and pronunciation and possibly also the meaning of a word will be wrong. Such letters, of which the central European states provide most examples, are: á, â, ă, ã, ą, ä, å; ć, č, ç; đ, d'; é, è, ê, ě, ę, ė; ğ; í, ı; ł, l'; ń, ň, ñ; ó, ô, ö, õ; ř; ś, š, ş; ţ, t'; ü, ů; ý; ź, ž, ż; and there are still more varieties. If these were transliterated, say *å* by *o*, *č* by *ch*, *ř* by *rzh*, *ş* by *sh*, it is quite likely that letters with addresses so spelled would fail to reach their destination. It therefore seems clear that we must retain such diacritical marks, though we may disregard the various signs used by certain learned bodies in transliterating some of the Asiatic and African languages that employ scripts other than Latin, such as Arabic. And if "conventional" names are to be dropped and native names with strictly accurate spellings are to be adopted, it follows that the very diacritical marks to which objection is taken cannot be omitted; *e.g.* Łódź, Nikšić, Bucureşti, Galaţi, Coruña, Kraków, Tekirdağ. No doubt most "conventional" forms will gradually fall into disuse. But though the Turks are forcing us to adopt İstanbul and Ankara by refusing to deliver letters addressed to Constantinople and Angora, we need not in ordinary use substitute Karadeniz Boğazi and Çanakkale Boğazi for our old friends the Bosporus and Dardanelles, and it will be difficult to dislodge names so firmly rooted in the English language as Rome, Venice, and Athens.

THE MECHANISM OF EARTH MOVEMENTS

DIE OSZILLATIONSTHEORIE: Eine Erklärung der Krustenbewegungen von Erde und Mond. By ERICH HAARMANN. *Stuttgart: Ferdinand Enke* 1930. xii + 260 *pages; illustrations and maps. M.*17 (*Bound M.*19)

SINCE the War there has been a remarkable recrudescence of hypotheses relating to the physical causes of mountain building and of earth movements generally. In the British Isles interest has been largely focussed on thermal processes, stimulated by the older work of Kelvin and the more recent investigations by Rayleigh and Joly on the radioactivity of the rocks. Elsewhere the fundamental geological importance of the heat generated by the radioactive elements has been strangely ignored, and, in Europe particularly, geologists continue to appeal to gravitational forces, cosmic and terrestrial, in the effort to solve the tantalizing problems of tectonics. Mainly, no doubt, this neglect of thermal factors is a reaction from the long-explored contraction hypothesis, an hypothesis now rejected by most geologists as mechanically inadequate and thermally untenable.

For fifteen years Professor Haarmann of Berlin has been developing the theory which he advocates with a wealth of illustration and a persuasive simplicity of style in this book. He bases his theory on three well-established observational results: (*a*) the constant striving towards isostatic equilibrium, rarely, if ever, fully attained; (*b*) the occurrence of up-and-down movements of the crust; and (*c*) the rhythmic course of crustal movements. The vertical movements are regarded as of primary significance. They are referred to the flowage of still fluid subcrustal material from one region to another in response to disturbances in the equilibrium form of the Earth. Among the possible causes of these disturbances polar wandering is considered the most promising; in other words, certain unspecified cosmic influences are thought to be responsible for distorting the Earth and shifting the position of the axis. Ultimately therefore the theory is incomplete and to that extent unsatisfactory. Assuming however that some such process of "primary tectogenesis" takes place, it follows that sunklands and geosynclines will be left over the regions from which the underlying sial has streamed away, and that, complementary to these depressions, great geanticlines will be upheaved where the sial accumulates. It should be noticed that unless the sub-crustal flowage is of sial material these consequences would not follow; as no evidence is forthcoming that sub-crustal sial magmas are available on the required scale—and indeed the actual evidence is conclusively against such a picture—this part of the theory is also incomplete and inacceptable.

Given the depressions and upheavals, gliding under gravity from the uplifted to the sunken areas leads to the more spectacular of tectonic phenomena. Folds, thrusts, and even the great nappe-structures of Alpine belts are ascribed, not to horizontal movements of the crust, but to the sliding forward of great crustal slabs down the slopes produced by primary tectogenesis. The gliding processes are described as secondary tectogenesis, and four types are visualized: (*a*) *free gliding* towards deep geosynclines in which sediments have accumulated, leading to arcuate belts of folded and overthrust structure; (*b*) *trough gliding* towards depressed regions filled with sediments, leading to asymmetrical close folding; (*c*) *fracture gliding*, where the strong upper crust breaks and slips along a layer of relatively mobile or lubricating material; and (*d*) *expression gliding*, related to (*c*), where plastic and fluid materials such as rock salt, coal, clay, magmas and ore-solutions are squeezed upwards as a result of lateral compression.

The conception of free gliding is an important one and it is genuinely repre-

sented in geological phenomena associated with the flow of glaciers, rock-glaciers, and lava streams, and with the submarine slumping of unconsolidated sediments. The latter is thought to have occurred in Sagami Bay as a result of the great Japanese earthquake of 1923, and it is almost certainly represented by some of the puzzling structures of the Permian formations of the Durham coast, but between these and the structures of the Alps there is an enormous hiatus which cannot be crossed by the aid of analogy alone. Gutenberg has recently suggested that deviations in the Earth's crust from a state of hydrostatic pressure may provide an important source of tectonic energy, but his quantitative estimates clearly show that the forces available are small compared with the strength of average crustal materials (*Proc. Wash. Acad. Sci.*, 20, 1930, p. 17). Japan, for example, is notoriously unstable, but it shows no special tendency to slip into the Tuscarara Deep. Although free gliding must be rejected as the main cause of mountain building, it must not be overlooked that this and related processes do occur on a smaller scale and that Haarmann's book provides a useful starting-point for their investigation.

The view that the limited distribution of the continents is related to the birth of the moon—which stripped off the missing two-thirds of the sial layer—is accepted by Haarmann. He does not however subscribe to the general opinion that the Pacific effectively represents the part of the Earth from which the moon was torn. In accordance with his theory he considers that the sial blocks left behind slipped down into the depression left by the moon and formed there the nucleus of Eurasia. Since then the continents are regarded as having been fixed in position. By local withdrawals of sial geosynclines have subsided; have become filled with sediments; the latter have been folded and overthrust by the sliding down of slabs from the adjacent upheaved areas; and finally, by the return of sial the cycle closes by uplifting the contorted regions into high mountain ranges, leaving new geosynclines adjacent to them, ready to start the process all over again.

No necessity for continental drift is felt, and this topic is therefore barely mentioned. Radioactivity and its effects are alluded to only to give the author an opportunity for saying that he cannot accept Joly's theory of thermal cycles. This turning of the blind eye to radioactivity is the more remarkable because one would have expected some reason to be given for the supposed occurrence of molten sial beneath the crust. Essentially what the author has done is to deduce from geological history and tectonic structures the existence beneath the continental crust of a layer of molten sial which moves to and fro in response to Earth distortions associated with polar wandering. Neither the deduction nor the exaggerated importance ascribed to gravity can be maintained in the light of modern geophysics.

ARTHUR HOLMES.

REVIEWS

LITTLE-KNOWN ENGLAND: Rambles in the Welsh Borderland, the Cotswolds, the Chalk Hills, and the Eastern Counties. By H. D. EBERLEIN. *London: B. T. Batsford* 1930. 9×6 *inches;* xii+132 *pages; illustrations and maps.* 12*s* 6*d*

The name of Batsford is sufficient guarantee that a volume is well turned out and tastefully illustrated. Many of the photographs in this book are new and undeniably attractive. It cannot be said that the text adds much of value. The treatment is uneven, varying from a mere string of village names to a seven-page account of Ludlow with historical anecdotes. It is rather ridiculous to pretend that places like Ludlow are "little known" nowadays; but many a motorist thinks he is "discovering" England, being apparently blind to the other touring cars on the roads and in the hotel garages, not to mention the contents of the bookstalls. In all the four districts here dealt with there must be very few villages that are not visited by at least one motoring party every summer's day. Intending authors of this type of book might allow those few to remain "unknown" instead of urging motorists to take to the lanes and hunt them down. J. H. R.

THE ANCIENT BRIDGES OF THE SOUTH OF ENGLAND. By E. JERVOISE, on behalf of the Society for the Protection of Ancient Buildings. With an Introduction by C. R. PEERS. *London: The Architectural Press* 1930. 8×5 *inches;* xvi+128 *pages; and illustrations.* 5*s* 6*d*

Bridges we are apt to take for granted, but time was when the building of one, and still more its upkeep, was a pious benefaction. Very few remain to us which were built over four centuries ago. Stopham, Sussex, which is generally called a fourteenth-century bridge, was no doubt built originally in 1347, but Mr. Jervoise rightly dates the present structure as probably of the sixteenth. This book should attain its object of interesting the public in the preservation, wherever possible, of old bridges: it contains a rapid, but interesting and fully informed survey of the bridges over the rivers in the counties south of the Thames, excluding those of Cornwall and Devon, for the treatment of which Messrs. C. Henderson and H. Coates are responsible. All the well-known examples will be found in these pages, *e.g.* Teston, Yalding, Aylesford, Stopham, Sonning, Abingdon, Dulverton, and Bradford-on-Avon, briefly described historically and architecturally, and illustrated by clear photographs. In spite of the map of 1724, Anfold-dean (p. 59) should be Alfoldean (Ald-fold-dean), pronounced Affuldean. The bridge here, probably built in 1810, did not carry Stane Street, which crossed the Arun a few yards east of the present bridge. The derivation of the Sussex word "Rape" is no longer "uncertain" (see 'The Place Names of Sussex,' vol. i, 1929). Use is made by the author of the Arun Water Bailiff's MS. recently edited by Mr. J. Fowler. S. E. W.

NATIONAL PARKS AND THE HERITAGE OF SCENERY. By VAUGHAN CORNISH. *London: Sifton Praed & Co.* 1930. 9×6 *inches;* xii+140 *pages; and map.* 5*s*

Dr. Cornish, who is a member of councils for the Preservation of Rural England, Wales, and Scotland, and has of late given much attention to the study of scenery, here presents us with a book which is essentially a synthesis of previous lectures and addresses in this field. This origin and the division of the volume into two completely independent parts gives it perhaps a somewhat disjointed character, Part I dealing with the "Preservation of Wild Scenery in National Parks," and Part II with "Pictorial Grouping in Agricultural and Urban Landscape."

In Part I the author makes certain proposals arising from the appointment by the Prime Minister of a Committee "to consider and report if it is desirable and feasible to establish one or more national parks in Britain with a view to the preservation of natural characteristics, including flora and fauna, and for the improvement of recreational facilities for the people, and to advise generally and in particular as to areas, if any, that are most suitable for the purpose." The term "National Park" has, of course, reference to large reserves on a totally different scale from private or urban parks, and will be familiar to geographers from the celebrated examples in the United States, Canada, and elsewhere. Dr. Cornish gives arguments for fourteen suggested parks: nine in England, three in Scotland, and two in Wales, indicated on a map, and selected as much as possible with a view of including examples of the different types of country in which Great Britain is so rich, with special reference to areas of great natural beauty or distinctive character. The fourteen areas are Glen Affric, the Cairngorms, the Cuillins, Tynedale and the Wall, Lakeland, Snowdonia, Dartmoor, the New Forest, the Forest of Dean, Dovedale, the South Downs, Broadland, the Pembroke coast, and the North Cornwall coast. Of these Lakeland and Snowdonia certainly speak for themselves, as also perhaps Dartmoor, Dovedale, the New Forest, the Forest of Dean, and Broadland. Glen Affric, in Inverness-shire, affords typical Highland glen scenery, the Cuillin mountains in Skye are celebrated for their ruggedness and wonderful atmospheric effects, while the Cairngorms, the culminating mountains in the kingdom, are largely primeval in character, where visitors may enjoy a bracing summer climate, and in winter drier snow for tobogganing and skiing than anywhere else in the British Isles.

A site amid the lonely moorlands of mid-Northumberland, including a section of Hadrian's Wall, the great Whin Sill, and the wild upper valleys of the North Tyne and Irthing seems happily chosen. The heather-clad moors of Northumberland are gloriously spacious, and are broken by dark craggy precipices impressively fierce of aspect in certain lights and weathers. In this part of the country the Cheviot Hills might also be considered for their solitudes of mountain and fell, pastoral foothills and Border flavour. North Cornwall and Pembrokeshire are suggested for coastal parks because here are to be found wild cliff scenery and secluded coves remote from great seaside towns in a region with more warmth and light in winter than any other part of our coast. In both Cornwall and Pembrokeshire too, frowning cliffs present a magnificent front to the Atlantic storm waves which would enhance the scenic value of a nature reserve in these parts.

A park somewhere in the South Downs is advocated, but doubt is expressed whether the project would succeed. In any case it is surely the part of the big Sussex coast towns to safeguard the heritage that lies behind them. If however the chalk type of country is specially English it should certainly be represented in any scheme of this kind, and we would like to suggest an area in the White Horse Hills in Berkshire and Wiltshire. These Downs of the King Alfred country are of wider extent than any other in the English Chalk country, but we know that parts of them have more than once of late been threatened by certain Government Departments for technical operations. It is to be regretted that no claim is made on behalf of the Malvern Hills, which are virtually a national park already with many unique advantages for health and recreation.

It may be doubted whether this movement will make much headway without a clearer idea than at present prevails of what function national parks, having regard to the particular case of Great Britain, are to perform. Is the idea to preserve areas of natural beauty in threatened regions—mainly in England, or to attract people to them in remote regions—mainly in Scotland and Wales? As Dr. Cornish points out, national parks would not go far to preserve the country-

side, and the most we can hope for is judicious town planning and constant vigilance on the part of such bodies as the National Trust. It would indeed be a sad day if ever the face of the country were to become so hopelessly disfigured by mass-production suburbs, factories, and speedways that sanctuaries were needed as museums to preserve samples of that haphazard medley of trees, hedgerows, commons, and meadows over hill and dale, that is even yet the glory of English landscape.

The other idea of drawing people to reserves where they can commune with Nature is stressed by Dr. Cornish, and it derives importance from the fact that there is much beautiful country, in varying degrees wild and solitary, in England as well as in Scotland and Wales, that is little known and visited. But measures would need to be taken to prevent national parks so conceived from being "opened up," and commercially exploited as "beauty-spots" or "Switzerlands of England."

In Part II Dr. Cornish analyses the aesthetics of scenery with illustrations from his travels in many parts of the world, giving valuable suggestions for the harmonizing of buildings and gardens with landscape. One feels however that there is a limit beyond which it would be unwise to carry analysis of this kind, and that there is more in beauty and its perception than can be reduced to exact terms.

L. C. W. B.

A WAYFARER IN WALES. By W. WATKIN DAVIES. *London: Methuen & Co.* 1930. 8×5 *inches;* x+212 *pages; illustrations and sketch-map.* 7*s* 6*d*

The Wayfarer Series now numbers over a score of volumes. The present comes nearer home than any of the others, but our attention is directed to the essential foreignness of Wales. Certainly the discerning Saxon visitor can hardly fail to notice the difference in atmosphere between Cambria and the scenically similar Cumbria. While evidently well acquainted with other countries the author writes with pardonable enthusiasm about his native land, but is by no means blind to its imperfections. Perhaps he is inclined to be too free with his superlatives, describing, for example, Clynnog church as far finer than any of the Welsh cathedrals, though later on stating that St. David's is the finest church in Wales, and that Brecon Priory is second to St. David's only. Merioneth is obviously the county of his choice, and it may be this favouritism that makes him neglect the lovely Carnarvonshire valley of Gwynant. Another notable omission is the scenery of the Neath glens. The illustrations are fairly representative of the Principality's beauties and need not have included a view of English Ludlow. "The Black Mountains of Brecon" is a curious title for the Brecon Beacons. The spellings "Llyn Glasyn" and "Aberglasyn" should have been avoided; and "Caernarvon" is a form that will please neither Welsh nor English authorities.

J. H. R.

A SCANDINAVIAN SUMMER. By HARRY A. FRANCK. *London: Methuen & Co.* 1930. 9×6 *inches;* xvi +397 *pages; and illustrations.* 12*s* 6*d*

Mr. Franck is speeding up his dashes about the world. In five months he has accounted for Denmark, Finland, Sweden, Norway, and Iceland, not to mention the Faeroes. Small wonder that he is liable to tie his readers into geographical knots and to give the impression, for instance, that Torghatten is in the Lofotens. But he writes amusingly in a breezy American style and in his rapid sketches hits off the salient features of a land, sometimes filling in details, we suspect, from statistics in year-books. The most striking characteristics of the five countries in his eyes were bicycles, timber, dinners, hay, and fish respectively; it is not unfair to say that he evidently enjoyed himself best in Sweden. He seems to have been unfortunate in his weather in the far north; if he had paid his visit to the Arctic in

this past summer of heat and drought, he would have received and recorded a very different impression in that respect. He has hardly done full justice to the Icelanders; but any one who has attempted to travel by motor car across the island must acquire a somewhat jaundiced outlook. It is, as he says, a long, long way to Akureyri; and Iceland is the last country in which to expect hustle. Scandinavia, by the way, may at a pinch be made to include Iceland but hardly Finland, whose people, the author admits, resent being lumped with the Scandinavians; but without Finland he would have done only four countries in five months. The book is well illustrated but wants something better in the way of maps than the inadequate affair inside the cover entitled, as the book might have been, "The Prince of Vagabonds in the Land of the Vikings." J. H. R.

LA LORRAINE METALLURGIQUE. By AXEL SÖMME. *Paris: Berger-Levrault* 1930. 10×7 *inches;* viii+250 *pages; illustrations and maps.* 30 *fr.*

M. Sömme, who is a professor at the Commercial Institute of Oslo, gives us here the result of two years' research into the metallurgical industries dependent on the Lorraine iron-fields. The book opens with a couple of pages devoted to the ancient iron industry of Lorraine, which was of a sporadic and spasmodic nature, dependent, as it was, on small scattered deposits of surface ore unrelated to the extensive beds of *minette* worked to-day, and on timber and local streams for heat and power.

The development of the modern mining and metallurgical industry began about the middle of the nineteenth century. Whereas the location of the iron works had in the past been dominated by the hammer streams, now it became dependent largely upon transport; for the scattered high-grade deposits began to prove insufficient and the depletion of the forests was becoming a serious consideration. Aided by the railways and canals a small local industry based on the *minette* ores had already arisen when the invention of the Gilchrist-Thomas process made possible the dephosphorization of the ore and the fabrication from it of hard steel.

The author proceeds to trace the history of the development of the iron-field, chiefly by metallurgists from other areas, and emphasizes the development of the "usine complète," *i.e.* of the steel works that have their own iron, coal mines, and coking ovens, or, at all events, their own smelting works. There follows a short sketch of the history of the metallurgy of each of the Lorraine iron basins including Luxemburg, and of the neighbouring coal basins. The inclusion of these latter is an interesting departure from the method of most writers on Lorraine and is very helpful to the understanding of the present situation. Chapter V deals with the relation of the Lorraine metallurgical industry to the various centres of coal and coke supply, particularly with the Ruhr. The question of transport is treated in an interesting manner in Chapter VI. Chapters VIII to XI inclusive are concerned with the changes that have come over the industry of Lorraine as a result of the Great War: the damage that resulted from the German occupation and exploitation, the effect of the changes after the Armistice in ownership, markets, and taxation, and in personnel in the workshops. Then come six chapters on the history of the labour problem. They describe the movement of the population (rural) of the plateau to the valleys, and the immigration of labour—from eastern Lorraine and Alsace and from Germany and Italy before the War and, since, chiefly from Poland. Special attention is paid to the instability of labour and its causes.

The rest of the book is mainly taken up with a consideration of the social conditions of labour, but the final chapters deal with the reaction of agriculture and the peasant community to the metallurgical industry.

It will be seen that the book is in no sense intended as a geographical study, and indeed a great part of the original research has little geographical bearing, but the geographer who will patiently go through this somewhat confusedly presented mass of mainly commercial material will find a great deal that is interesting from his own point of view and much that is new and suggestive. There are a full bibliography and several useful maps, but no index. H. O.

A HISTORY OF SPANISH CIVILIZATION. By RAFAEL ALTAMIRA. Translated from the Spanish by P. VOLKOV. With a preface by J. B. TREND. *London: Constable & Co.* 1930. 9×6 *inches;* xx+280 *pages; illustrations and map.* 21*s*

Spain has been treated cavalierly by the schools and universities, both in England and in America. Hundreds of thousands learn the Spanish language, and read at least something of Spanish literature, yet very few have more than a superficial acquaintance with the history of "the Spains," or with their historical geography, which is an even more important aid to the understanding of the somewhat enigmatical Spanish nation. A course of Altamira can be recommended with confidence to those who aim at such an understanding. His four-volume 'History of Spain and of Spanish Civilization,' now presented in single-volume form to English-reading people, gained its reputation not through its concern with reigns, dates, and battles, but because it laid proper stress on institutions, social customs, and international relationships. "His book," remarks Mr. Trend very truly in a somewhat nebulous preface to this translation, "is, in fact, an answer to the question why Spanish things are as they are—both in Europe and America."

The book in its original form was, of course, written for Spaniards, and it would have been improved considerably in its English form had some more extensive account been given of the geographical conditions of Spain than is contained in the two and a half pages (pp. 4–6) of introduction devoted to that question. English readers, at least, need to know more than this of "the natural setting in which the Spanish people has moved." It is good, nevertheless, that those who do not read Spanish should be able to enjoy and profit by the work of one who was so progressive a thinker and so able a teacher. They will find this well-produced and copiously illustrated volume much easier to move about in than the four stumpy tomes of the original. The translation is well done. There is a glossary, an index, and an annotated bibliography. The last contains several spelling mistakes, a fine disregard for accents, and some important omissions the less pardonable because a wealth of square brackets shows that the author's book-list has been revised quite recently. The index is not sufficiently complete. In a work likely to be used freely for reference it is essential that every proper name of any significance should be included. E. A. PEERS.

ZERMATT UND SEINE BERGE. By THEODOR WUNDT. *Zurich: Orell Füssli* 1930. (New edition.) 10×8 *inches;* xii+140 *pages; illustrations and maps.* 15.50 *fr.*, 14.20 *marks*

The new edition of this book is well produced and beautifully illustrated. It contains an excellent account of the mountains around Zermatt and of the most important climbing feats. The growth of the town itself, to which a chapter is devoted, might be described as a history of the growth of mountaineering, for Zermatt has witnessed the failure and success of innumerable attempts upon the High Alps. In 1842 it was still a tiny place "with a decent little mountain inn." Then came the ascent of Monte Rosa in 1855, and with it a new epoch in climbing. Within ten years all the other great peaks round Zermatt had been ascended, and not even the Matterhorn disaster of 1865 could curb, although it may have

delayed, the development of the practice. It was about this time that the Alpine clubs began to be formed and the education of climbers was taken seriously in hand. The author, who did not live to see the new edition of his work, has an honoured place among modern climbers, and he deals with all these matters with a practised hand. English readers will possibly turn elsewhere to revive their enthusiasm or to seek instruction, but the book is a valuable contribution to the literature of exploration and adventure among the High Alps, and the illustrations should secure it a place in every well-stocked Alpine library. M. L.

PREHISTORIC MALTA: the Tarxien Temples. By Sir THEMISTOCLES ZAMMIT. *Oxford: University Press* 1930. 10×6 *inches;* xvi+128 *pages; illustrations, maps, and plans.* 12*s* 6*d*

Archaeological discovery suggests that Malta owed much to its geographical situation in prehistoric times, as it does to-day. The remarkable megalithic monuments research has revealed in the island were evidently of a religious character, and may well have attracted visitors from other parts of the Mediterranean, especially the passing mariner anxious to offer thanks and sacrifice for a safe voyage, and to obtain oracular assurance of a prosperous continuance of it. No more important and extensive megalithic monument has been discovered in Malta than that fully described in this volume. It consists of three contiguous temples of the usual apsidal form, with adjacent outbuildings. A whole series of objects found in the floors—pottery, figures and other objects of clay, ornaments and copper implements, evidently date from the Bronze Age. Below these, separated from them by a sterile layer, were other numerous objects which Professor Zammit regards as neolithic. They consist of implements, figures, and ornaments of stone, some being of flint and obsidian, materials not found on the island; bone objects and pottery. If this conclusion is correct it establishes the existence in Malta of a neolithic civilization, regarding which there has been some scepticism. It is a rather startling revelation that the neolithic pottery is superior to that of the Bronze Age both in manufacture and in its decoration.

The inferences that may be drawn from Professor Zammit's very careful and detailed investigation are that in neolithic times there lived in Malta a people imbued with deep religious and artistic feeling that impelled them to erect these imposing temples, and to fashion a great variety of objects found in them; that they must have had some commercial dealings with other Mediterranean peoples from whom they obtained flint and obsidian; that in the Bronze Age a new and distinct people reached and settled on the island, a fact of interest in respect to the migration of peoples in the Mediterranean region in prehistoric times; that these discoveries give no support to the theory which associates megaliths with mining for precious metals, for none such, nor anything else worth quarrying, are found in Malta.

Printed in bold clear type, and admirably illustrated with a map, plans, thirty-three excellent plates and thirty-four clear black-and-white drawings, the work, whilst giving pleasure and satisfaction to the most exacting reader, must be a source of congratulation both to author and to publisher. E. A. P.

DER RHEIN: sein Lebensraum, sein Schicksal. Band I, Buch I, Teil 2; Buch II, Teil 2. Edited by KARL HAUSHOFER. *Berlin-Grunewald: Kurt Vowinkel* 1930. 10×7 *inches;* 244 *pages; diagrams and maps.* *M.*30

The first part of the first book of the first volume of this comprehensive work upon the region of the Rhine was noticed in this *Journal* for June 1929 (Vol. 73, p. 556). The second part, which has now been issued, completes the account of the physical geography of the area, which is the subject of the first book, but it

includes also a section on the mineral productions which belongs to the second book. No doubt this arrangement has been adopted in order that the parts as published may be approximately equal in size, but it is not ideal. Each of the published parts is paged independently, and accordingly the paging runs from the midst of one book into the midst of another.

The first section of this second part deals with the river and its tributaries. It gives the areas of basins, details of slope, discharge, variation of the discharge with the season, and other information of a similar nature. A river like the Rhine is a complex organism and receives tributaries from areas which are very different in character. Each of these tributaries has its own regime and each influences the regime of the Rhine itself. This is the reason why the seasons of high water and of low water are not the same throughout the length of the Rhine. All such matters are dealt with as fully as space allows. There is also a chapter upon the utilization of the Rhine and its waters, and another on the schemes which have been projected to increase its usefulness in various ways.

Nearly half of the volume is devoted to a detailed description of the bordering regions, from the watershed in the Alps to the lowland of the Maas and Schelde and the coast of Holland and Belgium. Changes in the river-system in recent geological times are dealt with, and in the account of the watershed between the Rhine and the Danube there is an interesting discussion of the underground waters. The subterranean watershed is here very different from the superficial one; and in dry seasons most of the water above Tuttlingen finds its way underground into the Rhine and not above ground into the Danube.

The last section is concerned with the mineral wealth of the area. Naturally, coal occupies the greater part of the space, but the iron and manganese-iron ores receive their proper share of attention, and the less important deposits are not neglected. It should perhaps be specially noted here that the work deals with the whole area of the Rhine irrespective of political boundaries. In the conception of the author even the coalfields of Northern France are included.

Apart from the paging, to which reference has already been made, the only serious deficiency is the paucity of figures in the text. Pictorial illustration may be out of place in a work of this nature, but more maps and diagrams would greatly help the reader. P. L.

DALMATIA. By MURIEL CURREY. *London: Philip Allan* 1930. 7×4 *inches;* 168 *pages; illustrations and sketch-map.* 5*s*

This is a handy little book which gives some account of the past history of Dalmatia, and detailed descriptions of the chief architectural treasures of the more important towns. It has some good illustrations and a rather rough end-paper map. It will doubtless serve its primary purpose of helping to spread a knowledge of the area among the travelling public, but is not of much direct importance to the geographer. The author is indeed curiously indifferent alike to those karstic phenomena which are such a delight to the physical geographer, to the contrast between the narrow and interrupted belt of Mediterranean vegetation and the barren mountains behind, which attracts the botanist, and to those problems connected with the siting of towns which to others constitute the chief charm of the country. Even if these be regarded as outside her sphere of interest the statement, twice repeated, that Dalmatia was united with Yugoslavia after the Great War will rather scandalize the historical purist. But much careful work has gone to the making of the book, and it is certainly true, as is stated, that the older standard works on the region cannot be readily carried about by the traveller, who will find here much of their matter in a condensed and compact form. M. I. N.

ALBANIA. (Collezione Omnia 22–23.) By ROBERTO ALMAGIÀ. *Roma: Paolo Cremonese* 1930. 7×5 *inches; 292 pages; illustrations and map.* L.13

This is a very useful little book which fills a definite gap. In simple language and with a skilful avoidance of controversial questions the author gives a concise account of the physical features, history, people, and resources of the area which now forms the kingdom of Albania. The text is illustrated by a folded general map, sketch-maps showing the distribution of minerals, of population, and of religious faiths, as well as by a number of plates and some useful tables. There is an excellent classified bibliography. The book is intended for a general rather than for a specialized audience, and owing to its direct and terse style can be read with ease even by those with not more than a moderate knowledge of the Italian language. We recommend it cordially to the notice of all those interested in the Balkan Peninsula.

A few notes may serve to indicate its scope. It is pointed out that official statistics have only recently been available, but even so must be used with caution. The book itself affords a curious illustration of this, for the author accepts without question the 1927 figures of a total population of some 834,000, whereas it has been announced that the census of 1930 gives the much higher figure of 1,300,000. Similarly the author says that the population of Tirana "to-day" is 17,000 (1927 figures were 16,500), but it has been stated that the 1930 figures show a total of 30,800—a very remarkable increase. There are some interesting notes on the vegetation, in part based on the author's own observations. He states that typical maquis rarely ascends as high as 400 m. in Central Albania, and tends to be replaced in dry areas by a dense scrub with many thorny shrubs. Among these Christ's thorn (*Paliurus spina Christi*) predominates and may render vast tracts almost impenetrable. The great oak forests of the interior may ascend to 1300 m. and are of great importance in local economy, not only for the fuel which they yield but because the acorns are used largely as food for livestock, including both cattle and horses. The long-delayed railway between Durazzo and Tirana is now being completed by an Italian company, and is expected to be open for traffic in 1931; it is being built to carry Italian rolling stock. On the other hand, all the light railways constructed during the War have been abandoned. There are a number of details in regard to trade, and the author takes a more hopeful view of the future than some other observers. M. I. N.

HIGH TARTARY. By OWEN LATTIMORE. *Boston: Little, Brown & Co.* 1930. 9×6 *inches;* xiv+370 *pages; illustrations and map.* $4.00

'High Tartary' is a sequel to the 'Desert Road to Turkestan,' in which Mr. Lattimore described his journey by camel caravan through Southern Mongolia from China to Chinese Turkistan. On arrival at Urumchi—the capital of Sinkiang, or the New Dominion, in the very heart of Asia, 1500 miles from Peking and 800 or so from the Indian frontier—the first thing Lattimore did was to telegraph to and for his wife, who was awaiting news in Peking—somewhat reminiscent of Burton's famous message to his wife in Damascus—"pay, pack, and follow." This Mrs. Lattimore did. She endured the Siberian railway from Harbin to Novo Sibirsk, and faced a seventeen-days' sledge journey across 400 miles of snow southwards to the Chinese frontier town of Chuguchak. Here the two met, and the result of their further wanderings onwards to India is contained in 'High Tartary.'

The title is well-found. Tartary—the Empire of Jengiz Khan—is a term belonging to the Middle Ages, but in such a region "the continuity of history, and the persistence into our own day of forces that once swept all Asia and all Europe"

is so dominant that no other word suffices. High Tartary is the central portion comprising the highlands of the Tien Shan and the Pamir plateaux.

As a traveller and observer Lattimore is both original and wide-minded. He fraternizes with the cameleers, the bazaar folk, the traders, and picks the brains of the postmasters, the officials, and the representatives of foreign governments. He studies the trade routes, old and new, and foresees which way the trader is going to jump. For the frontier trade is not what it was. Tientsin used to be the port of Chinese Turkistan; even the products of the most remote oases—Khotan, Yarkand, and Kashgar—were drawn towards the East, and actually reached the Pacific seaboard. But now all is changed, the traffic swings north to the Siberian railway instead of filtering eastwards across the Gobi, and the oldest and most famous trade routes are suffering from decay.

Lattimore is full of information on this new and important state of affairs; of the principal trade centres of these frontier regions we gain a good idea; of Chuguchak and of Urumchi, with their very mixed communities—Russian Reds and Russian Whites, Chinese officials and Tartar traders; of "incredible" Kuldja, with its even more mixed society, and its prospects as the centre of a "white man's country" with a great future; of atrophied Turfan and its stagnant below-the-sea-level atmosphere, and also of other happier and more alive oases in those most secluded deserts of Kashgaria, or Chinese Turkistan proper. A more healthy and more virile element of the population is met with in the chapters on the Nomads. Torgut, Chahar, Qirghiz, and Qazaq are encountered in their winter quarters, on migration, and on those lovely highland pastures which are their summer quarters. In chapter xxv Lattimore gives a brief, and so far as the reviewer knows the first, account of the revolt of the Nomads against Russian rule during the War, and of its consequences.

Leaving Chuguchak in early spring, the author and his wife travelled southwards across Dzungaria, and down into the Turfan depression. Retracing their steps to Urumchi, they followed the "North road" along the northern side of the Tien Shan to Kuldja in the Ili valley, thence over the range by the Muzart Pass into Chinese Turkistan proper, and by the usual route to Aqsu and Kashgar. From here they went by the "Five Great Passes"—that is to say, by the Karakoram route to Leh and India.

There are thirty typical illustrations and two maps. D. C.

PLANT HUNTING ON THE EDGE OF THE WORLD. By F. KINGDON WARD. *London: Victor Gollancz* 1930. 9 × 6 *inches; 384 pages; and illustrations.* 21*s*

This book is not entirely of the nature of the usual type to which its author has accustomed us. In the earlier chapters he is given to meditation, and to reviewing the very considerable experience and knowledge which he has accumulated of this corner of the world where India, China, and Tibet meet. There are some interesting glimpses of his descriptive powers, but some of his ultra-vivid exultations over scenery and plants appear somewhat heavily painted. Later he warms to his story and the other chapters are typical of his pen. They provide delightful and interesting reading which holds the imagination and enlists the reader's sympathy for the enthusiastic author-traveller and appreciation for the hardships which his love of his work entails.

Three aspects of the book stand out. Firstly the descriptions of the practically unknown and stupendous mountain country forming the ramparts of that part of the Empire. Then the running commentaries which accompany the enumeration of his botanical finds in which the Rhododendrons and Primulas figure chiefly. Thirdly, the accounts of the long-drawn-out privations which the author

endured with such dauntless spirit under the most trying alternation of moist tropical heat in deep narrow gorges, and storm and snow on exposed mountain sides.

On his second journey, which is described in the latter part of the book, he was accompanied by Mr. H. M. Clutterbuck, to whose merits he pays due tribute. The glimpses which are given of the miseries of their daily life caused by all things which fly, creep, or crawl; which bite or suck the blood; or which rendered their scanty provisions unfit for consumption, are more than sufficient to check any but the most adventurous spirit from following their footsteps. It is to be regretted that a map is not provided on a scale larger than those of the two over reduced sketches reproduced, to enable the reader to follow the travellers over the "Burmese Oberland," the sources of the Irrawaddy, to watch the crossing of the Diphuk La to the Lohit River, and the wanderings in the Mishmi Hills. It is to be hoped that the routes are more fully recorded for the benefit of those whose duties may take them beyond the "inner line" of administered territories.

Undoubtedly the author has his soul in his work, for how otherwise could he, when hungry, thirsty, thoroughly fatigued, and perished with cold, gloat over, for instance, his Lapponicum Rhododendrons—"a film of bright purple"; "a rippling lake of purple and violet"; "hundreds of square miles of windy fell awash in the shallow Lapponicum Sea." Elsewhere he meditates on scientific problems such as a comparison of the upper limits of plant growth on the Tibetan ranges north of the Tsangpo at 18,000 feet with those on the Mishmi Hills at 14,000 feet. The desolateness of these mountain fastnesses creates a deep impression: "it is the absence of man which the traveller finds so depressing and even sinister," and it was this which was such a striking note of Farrer's last journey towards this country. And again, "it is altogether eight marches from the last village on the Burma side to the first village in Zayul, through totally uninhabited country."

There are some delightful pen pictures; the Nungs' cemetery where "mock birds perched on tall poles represented the souls of the departed flying away"; the chief article of food available for purchase—the Mishmi egg; the many glowing descriptions of his plants and their homes. The photographic illustrations of scenery and flowers are excellent.

The book has a wide appeal: to the geographer; to the horticulturist, whether he be amateur or professional; and to the general reader interested in deeds of travel and adventure, real hardship, and narrow escapes. T. F. C.

THE PHILIPPINES PAST AND PRESENT. By DEAN C. WORCESTER. New Edition in one volume, with a Biographical Sketch and four additional chapters by RALSTON HAYDEN. *New York: The Macmillan Company* 1930. 10×6 *inches;* xii+862 *pages; illustrations and maps.* 25*s*

This important work was originally reviewed in the *Geographical Journal*, vol. 45, 1915, p. 330. In the present edition Mr. Ralston Hayden, Professor of Political Science in the University of Michigan, has contributed a survey of the author's life (running to 75 pages) with the object of giving the reader a better understanding of Secretary Worcester's views on the Philippines and of the problems of the United States in its dependency, while history has been brought up to date by means of numerous footnotes to the text and by three additional chapters which give a brief outline of the chief political and constitutional developments that occurred in the Islands between 1913 and 1929. The book is also furnished with a number of new appendices embodying material of use to the student of Philippine affairs. O. R.

UN EMPIRE COLONIAL FRANÇAIS: L'INDO-CHINE. Edited by GEORGES MASPERO. With a Preface by M. ALBERT SARRAUT. 2 volumes. *Paris: G. Van Oest* 1929, 1930. 13×10 *inches;* xxii+354, 300 *pages; illustrations and maps. Subscription price* 125 *fr. each vol.*

In a few months' time there will be held in Paris a great Colonial Exhibition, one of the declared objects of which will be to impress upon the world, and especially upon the French themselves, the magnitude and importance of the work that has been accomplished by the colonial genius of France. As a forerunner of this event M. Georges Maspero, assisted by a group of the foremost experts in matters appertaining to French Indo-China, has produced these formidable volumes which should go far to convince his compatriots of the value of their possessions in the Far East. That such a conviction is not at present sufficiently held seems a good deal on the minds of the Editor and his collaborators, for in many parts of the work references are made to the ignorance of the French People in Colonial Affairs and to the apparent indifference of politicians concerning Far Eastern responsibilities.

In the patriotic determination to dispel this ignorance and indifference the writers have not spared themselves. The story of the beginning and gradual expansion of French rule in Further India, the early intrigues of the Bishop of Adran, the taking of Cochin China, the establishment of Protectorates over Cambodia, Annam, and Tonkin, the overrunning of the Lao country and the ultimate "adjustments" of the Siamese frontiers, is set forth in the best possible light, and Garnier, Balny, Rivière, and other pioneers, once decried as foolhardy blunderers, are presented in their right aspect as the gallant gentlemen and patriots they were. The resources of the country, the amenability of its peoples, its equable climate, its natural beauties and marvellous archaeological remains, have all been most fully dealt with, as also have the results achieved by a succession of French administrators in diplomacy, education, sanitation, commerce, and scientific exploration and study. Amongst all this the thoroughness and the success of the scientific work that has been accomplished are conspicuous. Sailors, soldiers, and civil administrators have found solace during their intervals of leisure in scientific research, while successive Governors have founded institutions for the preservation of results and for their systematic development. Such development is lucidly described in the first volume of the work, the chapters on Art, Archaeology, and History by the Editor himself and on Religions of Indian origin by the learned Professor Coedès being, together with those on Ethnology, of special interest and importance.

The second volume is devoted to more material matters. The civil administration in all its branches occupies about 100 pages, with interesting accounts of the gradual supplanting by enlightened Western rule of ancient methods of Further India that obtained in Cambodia and the Lao country, and of the Chinese-inspired customs of Tonkin and Annam. The chapters descriptive of the Educational and Sanitary Services are instructive as showing the solicitude of the administration now obtaining for the welfare of the indigenous populations in its charge. Modern education seems to have made considerable progress, and has doubtless been much facilitated by the substitution of "*Gnoc-Ngu*," that is, the rendering of Annamese in Roman characters, for the Chinese script formerly used. The *École Française d'Extreme Orient* and the *Institut Pasteur de Na Trang*, organizations of which the fame and the material advantages are not confined to French Indo-China, are enlarged upon with pardonable pride.

In 200 pages devoted to Economics, natural products, animal, vegetable, and mineral, and also industries, are examined exhaustively. Stress is laid upon the great actual and potential wealth of the country and up-to-date statistics are made

available. The methods of the French as *colons* (*Anglice*, planters) and the results so far obtained by their enterprise are interesting and instructive. A rather backward state of Public Works, now being corrected, is attributed to paucity of funds, but may be in some measure due to too frequent change of Governors-General and consequent discontinuity of policy.

The geographical parts of the work are especially well done and the numerous maps and charts at the ends of the volumes are in accordance with the high standards of French cartography. An interesting collection of ancient maps of Further India is distributed through the text. The last section of the book deals with the picturesque, with sport and with *tourisme*, in ways calculated to arouse the interest of any who may be in search of new playgrounds.

M. Albert Sarraut, twice Governor-General of French Indo-China, Colonial Minister and Senator, contributes a preface to the work, combining a benediction on the labours of the Editor and his associates with a somewhat grandiloquent laudation of the altogether superior altruism claimed to have inspired French conquests in Asia. Students of Colonial Affairs will join him in congratulating M. Maspero on the appearance of this excellent book which sets the seal upon his fine record as explorer, administrator, and philologist, but, in the light of established fact, may decline to be convinced of much difference between French motives for Colonial expansion and those of other nations.

The illustrations are a notable feature. Those in the text are well chosen and good, while the plates are excellent. Pictures of Angkor, without which no book on French Indo-China would be complete, are numerous almost to redundancy. There is a copious index to each volume. The general appearance of the work is ponderous. The paper is heavy and glazed, the type excellent, the binding negligible. W. A. G.

KOREA OF THE JAPANESE. By H. B. Drake. *London: John Lane* 1930. 9×6 *inches;* 226 *pages; and illustrations.* 12*s* 6*d*

The writer of this book uses the subjective rather than the objective method; he gives his impressions of the foreigner, Japanese or Westerner, and less frequently of the Koreans themselves. He is a skilful writer, though on occasion he shows doubtful taste. He is especially illuminating on educational systems and on the clash of cultures in a little-known country, and he gives the impression of knowing much more than he says. The book is easy reading and amusing, but can hardly be said to add a great deal to our knowledge of the geographical problems of Korea. The photographs, on the other hand, are really good, but there is no map. L. H. D. B.

TRAMPING THROUGH AFRICA: a dozen crossings of the Continent. By William J. W. Roome. *London: A. & C. Black* 1930. 9×6 *inches;* xii+330 *pages; illustrations and maps.* 15*s*

Although this book would convey the impression that it is an account of a single journey, it is, according to the preface, a composite compilation of the incidents of a dozen trips undertaken for the British and Foreign Bible Society, all apparently embarked upon with inadequate equipment and carried out in uttermost discomfort. If we can accept his account, the energy and stamina of the author are amazing, and it is a wonder he has survived, if we consider the diseases which in Africa lie in wait for the careless traveller. A Buddhist reading the book would doubtless say to himself that the author was expiating in his present incarnation crimes of a previous existence, the sentence being to keep moving on at all costs, night and day, irrespective of weather and every other obstacle to travel; but of

course a collection of the purple patches in a dozen journeys is apt to give an unfair impression.

The book is fluently written and the author has incorporated a great variety of items of information which he has picked up *en route*—extracted from Government publications, other authors, and from missionary friends, in order to give appropriate local colour. The serious student will however learn little from this work, for although the author has the faculty of observation and also of description, it is obvious that travel at such breakneck speed can offer small opportunity for the collection of first-hand scientific information. There are moreover a host of minor errors due to the same cause and the spelling of native names is in many cases atrocious. With the exception of the frontispiece the photographs are probably the best feature of the book. C. W. H.

THE LONG TREK: around the World with Camera and Rifle. By RICHARD L. SUTTON. *London: Henry Himpton* 1930. 9×6 *inches;* 348 *pages; illustrations and sketch-maps.* 21*s*

This book is the product not only of a thoroughly experienced traveller and sportsman, but also of an accomplished raconteur on the subjects of travel and sport. The narrative runs with the detailed precision of a well-kept diary. It holds the attention and interest of the reader throughout by the human and personal manner in which it is told, while for many the attraction of the easy descriptive style will be increased by the dry American humour and cryptic American idioms which Dr. Sutton refers to as "Americanese."

This well-written account of a two-months' sojourn in the big game preserves of East Africa and Indo-China, diversified by picturesque descriptions of the two countries and their primitive peoples, should prove a valuable guide to those who follow the authors into those regions. Dr. Sutton's thoughtfulness in providing much useful data concerning routes, means of transport, sources of supply, and the all-important choice of weapons best suited to the game to be pursued, seems to cover all that the least experienced traveller or sportsman could desire. The fact that the *safaris* of Dr. Sutton and his son were organized on a scale characteristic of American methods of generous expenditure and thoroughness of detail contributed largely to the success and enjoyment of the various expeditions; but there remains a considerable surplus of credit to be given to the intrepidity, fine sportsmanship, and keen scientific intelligence displayed by both men. In his chapter on Kenya and Uganda Dr. Sutton pays a graceful compliment to the British gaol administration, and refers appreciatively to the instruction given to prisoners while undergoing sentence. But when he speaks of a Tom Browne belt we cannot help wondering whether he is thinking of Sam Browne or of Thomas Atkins.

The two chapters from the pen of Dr. Richard Sutton, junior, while more concise and statistical than the contributions of his father, are very interesting and show sympathetic understanding of the people among whom he spent a time of adventurous holiday. The reference to "floating away," or resignation of human life largely at will, reminds us that such semi-voluntary dissolution is not confined to the Wambulu tribe. It is by no means unknown in India, for example. The able and informative chapter on the Kiswahili language contains much useful matter in a small space.

Dr. Sutton speaks warmly of his photographic equipment, and well he may. The numerous and well-chosen illustrations provide an attractive feature in this volume, and speak no less eloquently of the excellence of the camera with which they were taken than of the skill and taste of its operators. W. G. G.

A NOMAD IN MOROCCO: Travels across the hinterland and desert's fringe, through Atlas snows and cities of the plain. By "BEN ASSHER." *London: H. F. and G. Witherby* 1930. 9×6 *inches; 324 pages; illustrations and maps.* 12*s* 6*d*

This is a volume which must rely more on such popular appeal as it possesses than on any claim to add to geographical knowledge or to a sound appreciation of interracial relationships. It is true that familiar desert conditions are well described in considerable detail, but even then the particular part of the country which the author is describing is not always sufficiently located for this to be regarded as a scientific handbook. He has also very definite opinions on French rule over native tribes, and about the inevitable international complexities in a country of divided authorities. His representations as regards the latter point are true enough, but his often violently expressed views on the former will not gain assent from any who know the Barbary States as a whole, and other travellers in Morocco would dissent from his allegations about the difficulties put in the way of serious students for political reasons. "All for France and devil take the Moors" is entirely contrary to the known policy of the French in Algeria and Tunisia, and we believe is an utterly false representation of their attitude in Morocco. The writer's observations as to their policy of "peaceful penetration" are almost the only ones on this topic which we can fully endorse. "Ben Assher" is more British than the Briton in his colour prejudice, and, not unnaturally therefore, completely misunderstands the Gallic or Latin feeling in this regard.

When we turn to consider the volume as a popular travel-book, we fear that readers will find their pleasure in perusing it considerably hindered by its verbosity, but still more by the writer's fondness for inverted sentences, and by his strivings after the introduction, often wrongly used and always unnecessary, of what he apparently believes to be English colloquialisms, but which are often merely the vulgarest and most inane slang (even *Paree* and, frequently, "veg." are not deemed unworthy of his pen); while he loves to invent sesquipedalian words of which "an equilitarianistic manner" is perhaps the worst instance which we have noted. Further, we cannot refrain from expressing a strong regret that he has allowed himself to make many personal remarks in very bad taste about European residents—and their wives—who can easily be identified by readers who have themselves visited these somewhat out-of-the-way parts.

The writer deserves praise for having obviously made notes carefully on the spot and at the time, though the triviality of many of the incidents related make us often wish that he had made a more careful selection and exercised a sterner censorship in transcribing his notes. W. C. P.

MYSTERIOUS SAHARA: The Land of Gold, of Sand, and of Ruin. By BYRON KHUN DE PROROK. *London: John Murray* 1930. 10×6 *inches;* xx+348 *pages; illustrations and maps.* 21*s*

In this volume Count de Prorok gives a rather highly coloured account of his recent travels in North Africa which included expeditions to Siwa, Ghadames, and the distant Ahaggar Mountains. The Ahaggar expedition was a most imposing affair. Besides the inevitable cinema-photographer it included a machine gun and a *New York Times* correspondent whose inspiring presence is felt on every page. So lurid are the colours in which the author describes the Sahara that, although we admire his enterprise and energy in this and other fields, we sometimes find it difficult to take him quite seriously. It is particularly to be regretted that his exuberance has led him into sprinkling his scintillating narrative with innumerable false statements of historical facts. For example, the Carthaginians were not the first people to turn elephants into "thundering instruments of war" as he tells us on p. 38; the Almoravid conquests do not belong to

the fourth century (p. 60); and Aski (*sic*) the Great was far from being the last of the Songhai rulers (p. 236). Had the Count read half a dozen of the more important works which he includes in his Bibliography he would have avoided these and many similar blunders. The book is illustrated with excellent photographs, but even these are not always accurately described. E. W. B.

THE RED MEN OF NIGERIA (FULANI). By Captain J. R. Wilson-Haffenden. With a Foreword by Bronislaw Malinowski. *London: Seeley, Service & Co.* 1930. 9×5 *inches;* 318 *pages; illustrations and map.* 21*s*

The first part of this volume, devoted to an account of the author's work as a junior Political Officer in Nigeria, will appeal to readers of travel books. The rest of the volume is composed of anthropological material which Captain Wilson-Haffenden collected in the course of researches among the Cow Fulani, or Borroro, and among the Kwottos of the Nasarawa (Benue) Province. His account of one of the Borroro clans is particularly welcome, for very little work has been done by trained anthropologists among this interesting and scattered people who differ so widely from their better-known relatives the Muhammadan or Town Fulani. The author's account of the Kwottos has already been published in the *Journal of the African Society* and merits the wider publicity which it will now enjoy.

The book is a useful addition to the rapidly growing literature of Nigeria. The absence of a map showing the places named in the text is greatly to be regretted. The roughest sketch-map might have been infinitely more helpful than the elaborate small-scale map which the publishers have provided. E. W. B.

THROUGH UNKNOWN AFRICA: Experiences from the Jaspert African Expedition of 1926–1927. By Willem Jaspert. Translated by Agnes Platt. *London: Jarrolds* [1930]. 10×6 *inches;* 288 *pages; portrait and sketch-maps.* 12*s* 6*d*

THE LAND OF THE PEPPER BIRD: LIBERIA. By Sidney de la Rue. *New York and London: G. P. Putnam's Sons* 1930. 9×6 *inches;* xii+330 *pages; illustrations and sketch-maps.* 15*s*

These two well-got-up volumes, both on West African subjects, are of very unequal interest. What was called the Jaspert African Expedition, we are told in the preface of 'Through Unknown Africa,' was undertaken in 1926 by the author and his brother, accompanied by the wife and small child of one of them. These young Frankfurt enthusiasts had only sufficient funds to buy a few necessaries and pay for their passages on a small steamer to the Angolan port of Lobito where their firearms were confiscated and they managed to start for the interior on foot. Their subsistence for the few months of their stay in Angola seems to have been obtained at first by working on a German farm, the brothers later being employed as engine drivers on the Benguela Railway, until eventually the family were shipped home by the German Consul "at the cost of the State."

The preface also states that the brothers overcame incredible difficulties by unbelievable endurance and looked death in the face countless times, but on perusal of the pages one finds chiefly an account of sordid personal experiences at places along the railway instead of exploration and adventure in unknown Africa. The translation from the German is imperfect. On p. 154, for example, a "bushel" of grass is spoken of, and the "aorta" is mentioned in connection with an injury to the foot. The book is not illustrated.

Of 'The Land of the Pepper Bird: Liberia,' one may rightly say with the publishers: "Here at last is a book which presents a complete and accurate picture of a country concerning which there is much general interest—the Black Republic of Liberia on the West Coast of Africa." The Liberian thrush, to which the

author presumably refers in his title, and whose "mission in life is to wake up West Africa at sunrise," is one of the most glorious of the comparatively few singing birds that Africa possesses.

Mr. Sydney de la Rue spent a number of years in Liberia in the capacity of its American Financial Adviser. With its policy of the "close door" for its hinterland, Liberia is almost unknown to the traveller, naturalist, and anthropologist. The author throws no light in this direction, but confines himself to Liberia proper—a narrow strip of coastal territory, explaining why there are "two distinct forms of government running concurrently: the oligarchy, operating under the form of a democracy, which is the government which presents itself to the world at large; the other, the tribal oligarchy—purely African and unchanged for hundreds, perhaps thousands, of years—under which ninety-five per cent. of the people live."

As a description of things as they are, as they were, and as they might be in this Negro Republic, this well-written and fully illustrated book is delightful reading. The author's powers of acute observation, his modesty and preciseness of detail are in striking contrast to many writers on West African subjects. A feature of the book is its comprehensiveness. Not only are the Krumen and coast dwellers discussed from every point of view, but space is found for trade, transport and shipping, sport and natural history, the babel of tongues and black man religion, forestry and the palm-oil industry, "Devil bushes," drum talk, farm cutting, the white man, the Administration, domestic slavery, and a hundred other subjects. It is much to be regretted that there is no index. In one respect only is the book incomplete: It is honey from beginning to end, and the reader may search in vain for such unpleasant subjects as suppression and exploitation of the hinterland tribes. C. C.

THE NATIVE STATES OF THE GOLD COAST: History and Constitution. No. II. Ahanta. Compiled from materials in the Native Affairs Department of Accra by C. W. WELMAN. *London: The Crown Agents for the Colonies (published on behalf of the Government of the Gold Coast)* 1930. 9×6 *inches;* 88 *pages; and map.* 2*s* 6*d*

This volume is the second in the series planned by the author when he was Secretary for Native Affairs on the Gold Coast to record the history and constitution of the many small States which make up that country. Some sixty pages of the little work deal with the history of the Ahanta division, and the author has devoted a great part of them to the narrative of the Brandenburg settlement on these shores from 1682 to 1717. For this concise account of an almost forgotten page of history, this little volume should be of value to the visitor interested in the varied past of West Africa.

Ahanta lies along the western shore of the Gold Coast. It stretches merely some 8 to 10 miles inland, but its commercial and geographic importance can be estimated from the fact that on its sea-front are the ports of Axim, Dixcove, Takoradi, and Sekondi. To-day when these shores are beginning to lose the romance of mammy-chairs and surf, and the steamer or tender lies alongside an unromantic wharf, when the palm-leaf roofs and mud huts of native villages are almost all replaced by the cement and corrugated iron of African townships, little volumes such as this are timely and welcome enough. They recall those days of high adventure which somehow seem almost too bold and daring to have been true. At the same time to the thoughtful reader Mr. Welman's clear analysis of the steps taken by his Government to reconstitute one division in the Ahanta country is of value as indicative of that steady work of creating or recreating native constitution which is Britain's policy of empire. A. W. C.

IN THE SHADOW OF THE ROCKIES. By C. M. MacInnes. *London: Rivingtons* 1930. 9×6 *inches;* viii+348 *pages; illustrations and maps.* 18*s*

Mr. MacInnes has put together a most admirable account of the history of Southern Alberta from materials collected by the Old Timers' Association of that region of the Canadian North-West. This Association was certainly most fortunate in its choice, and the story in all its many phases could not have been better told. It was indeed well worth the telling and as set forth in this volume (the title of which is rather misleading) is one of absorbing interest. After an entertaining account of this region and its early inhabitants, Mr. MacInnes gives a clear and succinct narrative of the travels of the first explorers who visited it, such as Hendry, Thompson, Fidler, and others, as well as of the manners and customs of the Blackfeet, Blood, Piegan, Stonies, and Sarcee Indians. He is exceedingly fair to the Hudson's Bay Company and its agents, to whom full credit is given for their services. One of the liveliest chapters entitled "The Wild West" describes the period between the rule of this Company under Sir George Simpson and the coming of the North-West Mounted Police. These were the days of Fort Whoop-Up and the Spitzee Cavalry, when human life was not held too sacred, as witness the following letter from a man at Whoop-Up to a friend in Montana: "Dear Friend, My partner Will Geary got to putting on airs and I shot him and he is dead. The potatoes is looking well. Yours truly, Snookum Jim."

There were forces for good as well in men like Fathers Lacombe and Scollen, Archdeacon Tims and John McDougall. The coming of the North-West Mounted Police also brought peace, but by then the repeating rifle had practically wiped out the buffalo and the Indians were in a bad way. The events leading up to the establishment of this wonderful force, which was lucky in enjoying the protection both of Sir John Macdonald and Sir Wilfrid Laurier, is admirably told and justice is done to the memories both of Colonel French and Colonel MacLeod. Some years ago when Mr. Mackenzie King sought to disband it, the public outcry was so great that he had to give way. Calgary was so named after the home of Colonel MacLeod's family in the island of Mull. The story of the great trek of this new force across the prairie, which in itself was a marvellous achievement, is graphically told and justice is done to the laconic half-breed Jerry Potts who saved the force from extinction and served it faithfully for so many years. It is an extraordinarily interesting tale that Mr. MacInnes has to unfold and one which should be perused by every Canadian who wishes to have a correct idea of his own country's history. Chapters are devoted to the Establishment of the Indian Reserves, to the Cattle, Horse and Sheep-Ranching Industries as well as to Agriculture and Mining, Missionaries and Education. A most varied collection of reliable data on all phases of life in this region is presented in a clear and attractive form. The author is rather contemptuous of the politicians at Ottawa and it is certainly true that had the representations of the heads of the North-West Mounted Police been listened to in 1885, and especially those of Inspector Crozier, the Rebellion of that year would never have occurred. Thanks to the labours of Father Lacombe however Chief Crowfoot was able to hold back the Blackfeet or otherwise matters would have been more serious. The Department of Indian Affairs at Ottawa also comes in for some well-earned criticism, but being so far away naturally had a very confused idea at times of the hard work its agents were called upon to perform. On the whole Canada's treatment of her Redmen has not been unfair. No phase of life in this beautiful region has been omitted, but the author always seeks to do justice to all concerned. If he blames he also praises where this is due: and his eulogy of Father Lacombe is especially well deserved, as is also that of those who negotiated the Indian Treaty of 1877.

The Bibliography of some nine pages is most valuable and contains a great deal of unpublished material. E. H. Maunsell's 'Reminiscences' seem to be missing in this list. Mr. Burpee's volume on La Vérendrye was published in 1927, not 1917. The maps are excellent, as are also the illustrations, which mostly take the form of photographs. Of these that taken at Lethbridge in 1886 showing the Bull Teams and the MacLeod Stage is particularly interesting. On p. 270 Lord Mountsteven should be Mountstephen. H. P. B.

PHYSICAL OCEANOGRAPHY OF THE GULF OF MAINE. By HENRY B. BIGELOW. (Bulletin of the Bureau of Fisheries. Vol. XL, 1924, Part II, pp. 512–1028.) Document No. 969. *Washington: Dept. of Commerce* 1927. 11×8 *inches; 516 pages; diagrams and maps.* $1.50

This volume concludes a series of three dealing with an oceanographic survey of the Gulf of Maine. Since it is a study of the physical and chemical environment, it more properly forms an introduction to the first two which deal with the fishes and the plankton respectively. The major part of the volume deals in considerable detail with the variations in temperature and salinity both regionally and seasonally; from a study of these the sources of the waters in the gulf and the circulation therein can be inferred. For these purposes, temperature is the more useful since its variations are greater; but salinity observations confirm them to a large extent. It is difficult to summarize the many observations, but, put briefly, it may be said that the temperature is dependent on the geographic situation rather than on the latitude. The upper 100 metres depend on climatic influences and the currents entering the east side of the gulf. Cold water from 100 to 150 metres in summer is merely the residue of the unwarmed water from the previous winter. Below this is the slightly warmer water which flows up the continental shelf and enters the gulf in varying quantities depending on the weather. Vertical circulation in the upper 100 metres, which are the most important from the point of view of plankton, is caused by the combined action of tides, winds, waves, and dynamic overturnings.

There are also sections dealing with the transparency and colour; drift bottle experiments indicated the prevailing currents. There are a few references to the influence of the physical conditions on animal life, and one short section deals with the hydrogen-ion concentration of the water. In this direction, perhaps, with concurrent observations on the plant nutrient salts and the phyto- and zoo-plankton, an extension of the work would be interesting. With its widely varying temperature conditions, the Gulf of Maine affords a good place for future work on the relationship between the animal and plant life and the physical and chemical conditions.

The observations on which the discussion is based are very numerous and date chiefly from 1912 to 1925. To present the results in a readable form is a task of considerable difficulty, and this the author can claim to have achieved. The matter is well arranged and the sections logically subdivided. Since it is likely to be consulted by many who are not concerned with the volume on plankton, it is to be regretted that the key charts have not been inserted in this volume to which they very properly belong. A. P. O.

NORTH CAROLINA: economic and social. By S. H. HOBBS. *Chapel Hill: Univ. of North Carolina Press* (*London: Humphrey Milford*) 1930. 9×6 *inches;* xviii+404 *pages.* $3.50

This work is intended as a source book for high school students of the State of North Carolina. It is, in essence, a reference book, compact of statistics and subject bibliographies, some of which are of use to the geographer. In an appendix of elaborate tables, occupying some 80 pages, the counties of North

Carolina are ranked in order of precedence in respect of population, education, agriculture, and wealth; and similar tables refer to the several states of the Union.

Now, while much of this statistical detail is important, there is almost as much which seems to the present writer to be of little significance. Figures of illiteracy for negro and white population (and these are still lamentably high in North Carolina) are of importance; but does the author seriously contend that, for example, the number of names in Who's Who per 100,000 of the population; or again the number of inhabitants per daily newspaper, can be adopted as serious criteria upon which to base any comparative statements as to education? There is too much of this sort of thing. The figures overflow from the tables and find a distracting place in what should be descriptive matter, with the result that no very clear picture emerges either of North Carolina itself, or of its physical, economic, and social relations with the rest of the country. On the other hand, the author presents data which both justify and give definition to the major physiographical divisions generally accepted by geographers for this state.

An interesting chapter is that dealing with farm tenancy. The lower order of tenants, the croppers and share renters, those who pay their rent and for the very tools of their trade by a share of the harvest, form a numerous and increasing class in North Carolina, and in the South generally, and one by no means confined to the negro population. Often illiterate, usually uneducated, unorganized, unable to pay cash for anything, and at the mercy therefore of highly organized credit systems, they are able to retain but a fraction of the wealth they produce. Of the cropper the author says, "He is constantly on the move from farm to farm. 'It ain't no trouble for me to move,' says the cropper, 'I ain't got nothing but er soup gourd and er string of red peppers. All I have to do is to call up Tige, spit in the fire place, and start down the road.' " So much for his hearth and home! We repeat: a useful book of reference for the regional geographer.

Ll. R. J.

DEATH VALLEY: the facts. By W. A. CHALFANT. *Stanford University (Cal.) Press (London: Humphrey Milford)* 1930. 9×6 *inches;* x+156 *pages; illustrations and map.* 16*s*

Most of us have been intrigued at one time or another by the distinctive markings attributed in our atlas to those areas of land below sea-level. Death Valley in California has the further interest of its awesome name and, for some, the knowledge of hardships endured by such of the 'forty-niners who trekked across it on their way to the Pacific. Approachable now by railways and the sightseer's car, it has lost some of its horrors, real and mythical; but the tourist, and for that matter the reader of this book, must indeed be lacking in imagination if he cannot appreciate the difficulties which in earlier times beset the traveller in the arid south-west. Yet, as the author points out, many of those difficulties were due to lack of knowledge. The bean-like pods of the honey mesquite might have provided food, and there are more water sources in Death Valley, if one knows where to look, than in some of its neighbours.

This readable little book is an historical and descriptive account of the valley, and, in addition, contains attractive and significant illustrations, and an index.

Ll. R. J.

THE PACIFIC BASIN. By GORDON L. WOOD. *Oxford: Clarendon Press* 1930. 8×5 *inches;* xii+340 *pages; illustrations and maps.* 10*s*

Part I of this book, consisting of six chapters, is concerned with general features (oceanography, climate, population, and natural regions); Part II with Malaysia and the East Indies; Part III, Australia; Part IV, New Zealand; Part V, the

Pacific Islands; Part VI, Asia; Part VII, North America; and Part VIII, South America. The standard may be described as approximately that for the Intermediate examination in an English University. A very fair balance has been kept in the regional treatment, though Australia and New Zealand have received an allowance which will be considered generous by English readers, with 89 pages, as compared, for example, with 50 pages devoted to Asia, which includes not merely the continental area of Pacific drainage, but also the Japanese and Philippine Islands. The book is well provided with maps and illustrations and has a short bibliography for each part. Its most valuable part for English readers is probably that dealing with the Pacific Islands. R. O. B.

VULKANKUNDE. By KARL SAPPER. *Stuttgart: J. Engelhorns Nachf* 1927. 9×6 *inches;* viii+424 *pages; illustrations and maps.* 36*s* 6*d*

This volume forms one of the 'Bibliothek Geographischer Handbucher' founded by Professor Friedrich Ratzel and now edited by Professor Albrecht Penck. It may best be described as a handbook of volcanic activity and, when considered from this aspect, it is of great interest and importance. In his Preface Professor Sapper states that his object is to give the clearest possible account of volcanic activity, the geomorphology of volcanoes and their geographical consequences to mankind—and to do this by means of a description of "the activity-expression of every single volcano." No one is more fitted to achieve this end than Professor Sapper, since he has spent his life in volcanological studies and in travels in volcanic regions.

The author's avowed aim leads, of course, to certain restrictions of his subject that many readers, particularly those with a geological bent, will find a disadvantage. For instance, the great East African peaks, having no record of recent activity, are not mentioned. On a broader view, too, the general geological setting and circumstances of volcanic activity are only incidentally considered. This subordination is evident moreover in the nature of the Petrographic Introduction (chapter i, pp. 1–31) contributed by the late Professor Alfred Bergeat of Kiel. This chapter was written before the War and has not been revised; it contains therefore no reference to post-war researches such as those of the Geophysical Laboratory of Washington, or of Daly, Niggli, and others. This chapter, as it stands, has little relation to the rest of the book, and may be ignored by the reader.

In his special field of volcanic activity, Professor Sapper gives a wonderful account of its innumerable aspects. He does this by means of vivid summaries of his own and other observers' work. He has endeavoured to present all views with scrupulous fairness. This method unfortunately leads in places to a somewhat indigestible mass of material, and many readers would prefer more critical summaries of the evidence. But this defect is balanced by the graphic beauty of Sapper's descriptions of his own observations and the wealth of picturesque detail given from the literature.

After Bergeat's petrographical introduction there is an account of the gas-content of the volcanic magmas, in which the views of A. Brun and the American school are contrasted. Sapper's conclusion is that the study of volcanic gases is only at the beginning, and that the last has not been heard of the "Law" of Ste. Claire-Deville, which states, it will be remembered, that the temperature and composition of volcanic gases depend on the time-interval from the volcanic acme and the lateral distance from the eruptive focus. Then follows a short account of the roots of volcanoes, short because Sapper is hurrying to the main part of his subject, the kinds of volcanic activity at the Earth's surface and their modes of dying away. Of great interest to geographers are the succeeding

chapters on the surface forms of volcanoes and their demolition by the agents of erosion. Periods of volcanic activity are then dealt with, and the thorny questions of the inter-relationships between different volcanic districts, and of the alleged connection between volcanic activity and sun-spot frequency are discussed.

Volcanic activity in relation to man is a theme that lends itself well to Sapper's method of presentation. Here he discusses first volcanoes as beneficial, as sources of water, mineral products, and fertile soils. Next are considered their evil results, in earthquakes, poisoning, explosive outbreaks, epidemics, ashfalls, hot clouds, and the like. He gives 190,000 victims of volcanic activity from 1500 to 1914 A.D., so that, compared with motor cars, volcanoes are relatively harmless.

In chapter x, all active volcanoes are enumerated, with summaries of their history, form, size, etc. In this connection, four folding maps are provided. Three of these give maps of the volcanic districts, whilst the fourth shows the volcanoes of the world. The volume concludes with a history of volcanological research from the earliest times. The accounts of the investigations since 1850 are particularly full and valuable.

As a presentation of volcanic activity this work will stand unrivalled and must take its place alongside the standard volumes of v. Wolff and Mercalli. The book is written in a German that is pleasant and easy to read. It is well printed and misprints appear to be few: on p. 21 *Granit* appears for *Granat*, but the context makes it plain which of this typographically troublesome pair is meant. The book is illustrated by thirty photographic plates of much beauty. Certain air-photographs of Javanese volcanoes taken by Dr. Taverne, and others of Popocatepetl, are of great interest. An index or list of the illustrations would help the reader. The book is furnished with an Author index, and a Place and Subject index.

H. H. R.

EINFÜHRUNG IN DIE GEOPHYSIK. III. Dynamische Ozeanographie. By A. DEFANT. (Naturwissenschaftliche Monographien und Lehrbücher. Neunter Band.) *Berlin: Julius Springer* 1929. 10×7 *inches;* x+222 *pages; and diagrams. M.*18 (*Bound* 19.80)

In this volume Professor Defant has brought together the chief results to be found in the scattered literature of dynamical oceanography. The treatment is necessarily mathematical, but the book is not a treatise on hydrodynamics; the fundamental equations are given, but they are not derived. Still, it is not difficult, once they are known.

The author opens with a section on the fields of gravity and of pressure, in which he accepts without comment the much-discussed dynamic metre. Then follows a description of the methods of reducing observations of temperature and salinity to a form in which they can be used for the calculation of equilibrium and currents. This is a practical question which often presents difficulties to beginners, and a more detailed treatment might have been helpful. There are some misprints in the example. The second section deals with the internal and external forces acting on a body of water, and the third with the statics of the sea, the stability of various structures, and the adiabatic increase of temperature downwards which complicates the problems in a few regions. The fifth section, on the general dynamics of ocean currents, takes into account the effect of the rotation of the Earth, dealing at first with the ideal case of a frictionless homogeneous sea, and later with another ideal case, in which friction is included but the water is homogeneous. An account is given of V. W. Ekman's theoretical work on the pure drift current caused by a uniform wind blowing over a limitless ocean; the current is deflected at 45° *cum sole* from the wind at the surface, and the deflection increases downwards while the velocity decreases, until at a few

hundred meters the velocity is negligible and the direction is reversed. The problem is an ideal one, but at the surface it is fairly well confirmed by observation. This section contains a few pages on the mixing of waters, to which increased attention has been given of late. It is to be wished that the short reference to Helland-Hansen's ST relation had been longer; it is not a dynamical question, it is true, but it leads to one, and the original paper is in Norwegian. The subject of stationary or unchanging currents in a stratified ocean is dealt with in the sixth section, and in the seventh we have the famous circulation theorem of V. Bjerknes, from which Helland-Hansen and Sandstrom derived the method for calculating from observations of temperature and salinity at two positions the change downwards of the horizontal current due to density, or rather of its component at right angles to the line joining the positions. If the velocity at any depth is known, then it can be calculated at all others.

In discussing the oceanic circulation, Professor Defant sees in the winds the chief cause of horizontal currents, though he does not underestimate the influence of density on the vertical circulation. The importance he attaches to the winds will probably not meet with the approval of his Scandinavian colleagues, to whom the book is deservedly dedicated. His introduction into oceanographical terminology of meteorological terms such as stratosphere, troposphere, and in particular polar front is another point which will provoke criticism; some oceanographers, at least, consider that he has pushed the analogy too far. The ninth section deals with waves, both surface and internal. The question of internal waves is one which has been rather neglected, since its practical study requires that ships should be anchored for considerable periods of time, often in deep water. In the section on tides the author discusses chiefly some special questions relating to channels and enclosed seas; the equilibrium and dynamical theories are omitted since they are to be found in all the special treatises.

Professor Defant has done a great service to oceanographers in writing this book, for there are few laboratories where all the literature is accessible.

D. J. M.

NANSEN: A book of homage. Edited by J. H. WHITEHOUSE. *London: Hodder and Stoughton* (1930). 9×6 *inches;* 190 *pages; illustrations and sketch-map.* 8*s* 6*d*

The sub-title adequately describes this book. The main substance consists of a series of tributes made at a meeting held in London in June 1930 in furtherance of the scheme to raise funds for the preservation of the *Fram*. This project was originally intended as an act of homage to Nansen: on his death it was continued as a memorial to his work. Most of the writers, among whom are Professor Gilbert Murray, Viscount Cecil, Mr. Noel Baker, Mr. H. W. Nevinson, and the editor, dwell on Nansen's work in the League of Nations and the repatriation of refugees after the war—work for which he was awarded the Nobel Peace Prize in 1922. In these papers there is little but eulogy, although some contain vivid word-pictures of the man. Dr. H. R. Mill is the only contributor who has much to say on the scientific side, and he adds a short but valuable sketch of Nansen's life. A tribute reprinted from the *Manchester Guardian* dwells on Nansen as an explorer. There are two portraits of Nansen and several views of the *Fram*. The volume might have been better balanced, and so given a truer picture of a many-sided man. Nevertheless, it will be read with interest by the many who admired Nansen and shared his ideals.

R. N. R. B.

THE GEOGRAPHICAL INTERPRETATION OF TOPOGRAPHICAL MAPS. By ALICE GARNETT. (Harrap's New Geographical Series. General Editor R. N. RUDMOSE BROWN.) *London: George G. Harrap & Co.* (1930). *Text:* 8×5 *inches;* 304 *pages; illustrations and maps. Atlas:* 11×9 *inches;* [50] *pages. Text* 7*s* 6*d: Atlas* 5*s*

This work should be welcomed by three types of readers: the university student of geography, for whom it is primarily intended; the teacher in school, who may use parts of it in teaching; and the lover of the countryside who also takes an intelligent interest in its representation on maps. This last group in Britain is already a large one, and, happily, seems to be increasing rapidly. For this reason it is to be hoped that Miss Garnett's book will become widely known outside academic and scholastic circles, for it contains much of the essence of geography, imparted generally in an agreeable way, while at the same time inviting the reader to devote considerable concentration to the map. This concentration will for the most part be well expended, for it is safe to say that few realize how much really interesting information is contained in a good topographic map.

It will be gathered that the book takes the reader far beyond the limits usually reached in "Aids" to map-reading. In thirty-two pages it disposes of the matter commonly regarded as the substance of such works—scales, contours, slopes, intervisibility, and the rest—and then devotes Section II (of 75 pages) to "The Physical Basis; the reading of physical and general geological facts." Here the author certainly succeeds in showing the effective manner in which the land forms may be interpreted from the map. The reader is constantly invited to consider possible alternative explanations and shown why some may be accepted and others rejected. The explanations thus deduced from the topography refer not only to the work of the chief agents of erosion, but also to the fundamental geological formation and structure; and some will undoubtedly question the author's point of view in this matter, set forth in Section I and evident throughout the work. Miss Garnett, in the Preface, states her belief that "the geological facts of most value to the geographer can frequently be traced on the topographical map from other lines of evidence, as suggested in Chapter III. Therefore to a geography student the geological map should be an ultimate source of reference for verifying facts of geology which the topographical map may have suggested." By this method the budding geographer is certainly given exercise in reasoning, but other readers may well be impatient, and prefer to cut out these particular arguments and procure the geological map at once. This feature of the book however is the only important one that seems open to serious criticism. The accounts of "River Work" and of "Rejuvenation" are clear and interesting, and the examples are well chosen; for instance, ocular evidence of the downstream migration of meanders—from deserted parish boundaries along the River Exe (Fig. 12)—is welcome. The chapter on "Glacial Phenomena," with Swiss, Welsh, and Scottish examples, is also good.

The last half of the book (Section III; The Interpretation of Human Geography) contains the chief novelty, and it is this section that is to be recommended specially to the general reader. While still always following her main purpose of giving instruction in map-reading, the author has contrived to work in what amounts to a series of brief geographical essays upon the adjustment of man to his environment in various contrasted regions; in the south-western part of the Weald (due acknowledgment being made to Dr. H. R. Mill's essay in the *Journal* for 1900); in South Devon, Dorset, Somerset, and Northern Norway—all as contrasted coastal types; in three Alpine valleys and in North Wales—for glaciated regions. An interesting feature of the Alpine studies is the inclusion of a table (p. 160) showing the number of dwellings counted on the map, compared

with the numbers, from the Census, of dwellings inhabited at a given date, and thus bringing out the difficulty of estimating population from the map in a region where seasonal transhumance takes place. The treatment of Carlisle and of Wareham may be instanced as excellent examples of exposition—town sites and plans being studied from the map in relation to historical considerations. The last chapter is an interpretation of two sheets of the map of the Gold Coast (1:125,000) including 1500 square miles of country, and comprises a short but well-balanced essay on the whole region; its scope may be guessed from the fact that four pages are devoted to the distribution of tsetse fly. Throughout Section III there are many evidences that serious research has contributed to the general excellence of the text.

In the book there are thirty-two useful maps and diagrams, which are well drawn, though Figs. 27 and 32 lack scales, and on Fig. 28 "chalk" should read "chalk and limestone."

Throughout the work however attention is mainly directed to the Atlas, which, forming a separate volume, contains twenty-five maps as well as several photographs and diagrams. Some of the maps are printed in black, others in black and red. Sixteen are parts of British Ordnance Survey One Inch sheets, of which three have been reproduced directly, the rest being redrawn. Four are redrawn from United States topographic sheets (1 : 62,500), four from Swiss sheets (1 : 50,000), and one from a Norwegian sheet (1 : 100,000).

The most obvious and important feature requisite in a publication of this kind is that the maps show clearly everything referred to in the text; and with few exceptions they do this. The second desideratum is a price within the reach of as many students as possible; and it may be allowed that the price is moderate. But it is also desirable that maps derived from beautiful originals be attractive, and not merely legible. And this they certainly are not. Perhaps it proved impossible to obtain beauty at the price. But these maps will not commend themselves to map lovers—not even those copied directly, for the printing leaves something to be desired. Of the others it may be said that they represent good amateur draughtsmanship, in a few cases marred by poor lettering, and more often by irregular inking and register in printing. A very curious and unfortunate feature of the Atlas is the varied scales of reproduction. Of the maps derived from the British One Inch series, no two are on the same scale; and the same applies to the American and Swiss maps. In the sketch of hill profiles (with Map II), the viewpoint being a boat at sea, the shore-line should be a horizontal base line.

These criticisms are made in the hope that the book and Atlas will quickly reach a second edition; for the publication of the work as a whole is greatly to be welcomed; and moreover it need scarcely be pointed out that the text may be read along with the original sheets by those who are prepared to buy them.

A. G. O.

THE WORLD'S POPULATION PROBLEMS AND A WHITE AUSTRALIA. By H. L. WILKINSON. *London: P. S. King & Son* 1930. 9×6 *inches;* xviii+340 *pages; illustrations and maps.* 18*s*

The output of books dealing with the various aspects of the population problem continues without abatement, and the reason is not far to seek. The generally disturbed state of society, which is especially shown in the phenomenon of unemployment, compels attention to the mere question of the numbers of human beings who contrive to live on the surface of this limited world. So long as affairs are prosperous, so long as the circumstance of existence continues to improve, so long may the numbers of the inhabitants of a country increase, without any one questioning the desirability of the injunction to increase and multiply. But let the

bad times come, let the pressure of over-population begin to be felt, and it becomes inevitable that thoughts should arise as to how many men and women the countries of the world can support, as to at what rate the various populations are increasing, and as to the end and outcome of the present tendencies of population growth. The book under review can be confidently recommended as giving, in one volume, a clear, fair, and well-written outline of this great and important subject. The author divides his book into two main parts. The first deals, in the space of some 200 pages, with the population of the world, with what he calls "the over-populated continents," Europe and Asia; and the "under-populated continents," North and South America, Africa, and Australia. He takes the various countries by turn, and describes the statistics, the rates of increase, industrial and agricultural factors, standards of living, and migration; and he does not forget to consider the financial resources and means of development of the various states dealt with. He carries one easily through these various intricacies, and pays particular attention to the question of the relief that may, in some cases, be afforded to over-populated lands, by emigration. It is interesting to note that the author makes considerable use, and rightly, of the Report of the World Population Conference, which was held at Geneva in 1927, when, for the first time, representatives of many nations got together and discussed these matters. The first part of the book ends with a quotation from Mr. G. M. Bruce, ex-Prime Minister of Australia, who, in 1926, said, "The question was, how long could Australia hold back the flood? Unless Australia was prepared to move forward at a pace never previously contemplated, they would be faced with a situation which would make all good Australians shudder to contemplate it."

The author discusses the problem of the ultimate size of the population of Australia, and comes to the conclusion, based chiefly on the probable amount of cultivable land that the country could support, at the present standard of living, some 23,000,000 persons. This figure is very much lower than some other authorities have given, but it is not a bad thing to make estimates on the safe side. He points out that with a lower general standard "and with agriculture on the basis of peasant proprietorship, the limit could be increased to several times" the above-mentioned figure. An interesting section deals with the effect, on a European race, of a tropical climate. The view taken is that, in the end, such a climate produces a weakening effect on races derived from temperate regions.

The second part of the book gives a clear exposition of the "White Australia" policy. It is shown that any policy of the immigration of Asiatic labourers, who would be accustomed to a much lower standard of living, would bring much evil in its train. It would, in fact, tend, in some form, to reproduce the condition of affairs now existing in South Africa, which has its white population, its native population more than three times as large, and its army of "poor whites." The situation with regard to European immigration is not so obvious, and the book ends with a question, "Should she (Australia) not now make an effort . . . to secure as citizens many of Great Britain's and Western Europe's surplus people, whilst they are still available and desire to migrate? Should she not put beyond any doubt the effectiveness of the occupation of Australia by European people?" An important book. C. F. C.

AN INTRODUCTION TO REGIONAL SURVEYING. By C. C. FAGG and G. E. HUTCHINGS. *Cambridge: University Press* 1930. 9×6 *inches;* xii+150 *pages; illustrations and maps.* 7*s* 6*d*

The authors of this work set out in some detail the methods they have found useful in carrying out a regional survey, which they describe as "the organized study of a geographical area and its inhabitants, plant, animal, and human, from

every aspect, and the correlation of all aspects so as to present a complete picture of the region." Such a survey, they further point out, "may be undertaken from any of three motives, or all of them. It may be regarded as a piece of pure research, as a method in education, or as a preliminary to a scheme of civic improvement or development, *e.g.* a town or regional plan." Parts of the book have a distinct geographical bearing, and may be suggestive to students and teachers of geography, *e.g.* Fig. 1, illustrating the relationships between the various branches of regional study, and Fig. 22, a specimen transect (*i.e.* horizontal section) chart showing the correlation of the physical and human conditions in a particular region, while useful information is given about the various maps issued by the Ordnance and Geological Surveys, with hints, rather than complete instruction, as to the drawing of sections and block diagrams and the making of relief models.

Yet it would appear that the main interest of the authors is directed to sociology rather than to geography. Thus their unit of study consists of one or more parishes, and they state that "a civic centre is the essential nucleus of a survey area," while in their final chapter on "Interpretations and Applications" most of the space is devoted to an adaptation of Professor Geddes' conception of eight zones of a typical valley with their appropriate rustic types.

The reviewer, possibly because he looks at the matter too much from the geographer's point of view, fails to see the significance of much of the detailed work about which full instruction is given. While realizing the value of careful observation and mapping, he doubts the practical utility of demanding that every area and object shown on the 6-inch map should be numbered, and its exact description written on a similarly numbered index-card, *e.g.* "113. Meadow, three horses grazing, much sorrel, mushrooms." As a geographer, he would prefer to find instruction as to how to recognize the relative significance of features, to select those which are important, and to indicate their essential relationships. Yet those students and teachers of geography who already know how thus to evaluate, select, and correlate material, may find in this book practical aid towards routine work of collection, classification, and presentation. J. F. U.

PICTURE WRITINGS AND OTHER DOCUMENTS. By NÉLE, CHARLES SLATER, CHARLIE NELSON, and other Cuna Indians. Comparative Ethnographic Studies. Vol. 7. Part 2. Published by Erland Nordenskiöld. *Göteborg: Elanders Boktryckeri* (*Oxford: University Press*) 1930. 10×7 *inches; 76 pages; and illustrations.* 8*s*

This is Part 2 of the Seventh of the Comparative Ethnographic Studies published by Baron Nordenskiöld. It is a continuation of the first part, which gave an interesting account of the Picture Writing of the Cunan Indians of Panama, and was reviewed in the *Journal* for January 1929 (vol. 73, pp. 87–88). The contributors to this volume are the paramount Chief Néle, and two Cunan Indians who have adopted the European names of Slater and Nelson. The first document is a Cunan myth of the Creation of the World written in English by Slater. The second describes the departed soul's wanderings through the nether world. It was dictated to Nordenskiöld by Néle in the Cunan language, translated into Spanish by a Cunan Indian, and is illustrated by picture writings. Incidentally, Néle's narrative reveals the moral philosophy of the Cunan Indians. It shows a remarkable consideration for animals, a sentiment foreign to the Christians with whom they were brought in contact. Theft and adultery are most severely punished, and ill-treatment of women and children condemned; they are to be advised quietly in plain language. The third contributor, Nelson, is a learned medicine man. He endeavoured to explain his conceptions of the demon world

by drawing sketches which are reproduced. One of them represents the Sun ship on which diseases of many kinds travel as passengers. They are of different colours, *e.g.* blue and red illnesses. Colour magic here plays an important part as is usual in Cunan conceptions. Another represents the Moon ship on which black illnesses travel. The idea is that the Sun and Moon travel by ship across the vault of the sky, and Nordenskiöld remarks that he knows of no other Indians possessing it. Nelson also made a sketch (reproduced) representing important Culture heroes. These have no creative powers, only God can create. In fact, these Indians draw a marked distinction between God and their Culture heroes, to whom however all important discoveries are ascribed. Gold was discovered by the greatest of them, Ibéorgum, who also invented picture writing. This medicine man had in his hut a remarkable collection of objects, including quaintly carved wooden figures, clay braziers for burning plants in incantations, and, most curious of all, a small yellow pebble inside which dwells a tutelary spirit which plays an important part in incantations, seeking and releasing ravished souls. Such stones are also used in curing fevers. Stone magic is much regarded by these Indians, who have no idea of stone celts having been used by their forefathers. Baron Nordenskiöld states that he has a good deal more material in his possession, but does not propose publishing it until he is able to make himself better acquainted with the language, and spend more time among this interesting people. E. A. P.

ANDREE'S GEOGRAPHIE DES WELTHANDELS. Band III. Produktion, Verkehr und Handel. Edited by H. LEITER and B. DIETRICH. *Wien: L. W. Seidel und Sohn* 1930. (4th edition.) 10×7 *inches;* xii+692 *pages; diagrams and maps. M.*40 (40*s*)

This volume, as its title implies, deals on a world basis with production and international trade, the regional foundations of which have already been dealt with in the first two volumes. It follows that the function of this portion of the complete work is to supplement and synthesize, not to repeat, what has gone before; and this accounts for an emphasis on statistical aspects of the various topics to the almost complete exclusion of geography in the real sense of the word. This is perhaps more obvious in the first section of the book (Production: contributed by Dietrich), where the opportunity for geographic correlation is more immediate—and this despite an excellently written introductory chapter on the scope and method of Economic Geography, emphasizing the fact that the sphere of the subject is the study of the relationships between economic activity and natural conditions. Nevertheless criticism to be relevant must have reference not to this general omission, which is deliberate, but to the authors' success in carrying out the plan laid down.

From this point of view the only general criticism that suggests itself is that proportions might with advantage have been different. The second section of the work (Transport and Trade: contributed by Leiter) occupies three-fifths of the total space, despite the fact that by its very nature it could better have stood compression than section one. And compression is very marked in the first section, so much so that there results at times a distortion of emphasis that may amount almost to positive error. One or two instances may be given. In discussing cereal supplies, Dietrich compares the rates of increase of wheat acreage before and after the War, demonstrates that the rate of increase is decreasing, and stresses the necessity with increasing population of developing new "granaries," suggesting among the more immediately practicable Siberia, Asia Minor, the Far East, and Oceania. But in view of the fact that he does not take into account decreasing rates of population increase, the increasing importance of conscious

birth control, and the possibility, already discernible, of dietetic changes for the white race, his implication that mankind is rapidly approaching the danger point in relation to food supplies is surely unwarranted. Other examples are the omission of Holland, U.S.A., Australia, and the Argentine from the table of dairy cattle (p. 171), the dismissal of India and Egypt as raw cotton producers in one short paragraph (p. 183), and the inclusion of New Zealand for most purposes (*e.g.* wool production) with Australia.

In the second section successive chapters on Transport, dealing with Roads, Railways, Inland Waterways, the Ocean, and the Air, are followed by an account of the nature, amount, and directions of international trade. The chapter on Air Transport deserves special mention: in addition to giving the regular air routes for the whole world, it discusses admirably the nature, functions, limitations, and prospects of air transport.

Throughout the book the statistical material is excellent: tables are very numerous, and in most cases include results for 1929, with even an occasional reference to the early months of 1930. Maps and diagrams are relatively few, but good. A commendable feature is the special bibliography (mainly German, of course) at the end of each chapter. This volume contains a full index for the whole work.

R. O. B.

DECENTRALIZATION OF POPULATION AND INDUSTRY: A New Principle in Town Planning. Papers contributed by several authors, edited by H. WARREN and W. R. DAVIDGE. *London: P. S. King & Son* 1930. 7×5 *inches;* xii+154 *pages; and diagram.* 4*s*

This book discusses the need for and the present characteristics of the modern trend towards decentralization of population and industry; and as a substitute for haphazard growth, it outlines the new principles of orderly town and regional planning for the redistribution of population and the improvement of conditions in existing congested urban areas. With an introduction by Dr. Raymond Unwin, there are ten chapters each written by a different leading authority: an arrangement which results in the useful expression of different points of view, but also in much needless repetition. Within the narrow compass of 150 pages a vast field is briefly covered. The treatment is necessarily sketchy, but useful to the general reader as an introduction to a group of related problems of fundamental importance to the individual and the nation. The chapters, each 10 to 15 pages long, deal with the health of towns, traffic congestion, garden cities and satellite towns, regional planning, national planning, open spaces, the country town, the zoning of already existing urban areas, and the defects of existing town-planning legislation.

R. E. D.

EMPIRE STOCK TAKING. By L. ST. CLARE GRONDONA. *London: Simpkin Marshall* 1930. 9×6 *inches;* xii+366 *pages.* 10*s* 6*d*

This book deals with a topic that is at present of great public interest. Further, says Mr. Grondona, it "*contains no propaganda* (author's italics); and it is confined, as will be seen, to a statement of facts, which, while being incontrovertible of themselves, inevitably lead to the drawing of deductions that are controversial." That the subject is controversial is sufficiently obvious. Mr. Grondona's mission is to provide effectual basis for the discussion of both ideals and policy. His treatment is therefore necessarily statistical, and the most valuable portion of the book are the tables and diagrams. The work is arranged in three parts. Part I, twelve chapters, deals with the Empire production of a fairly complete list of foodstuffs, together with tobacco, petroleum, raw cotton, raw wool, rubber, and other raw materials. Part II (six chapters) deals with the overseas intra-imperial

trade in a selected list of manufactured articles, concluding with a summary of the tariff powers of the various members of the Overseas Empire, and the preferences at present accorded to British goods. Part III discusses Great Britain's overseas trade, with special reference to the percentage accounted for by the Empire. An appendix gives a more detailed picture of Great Britain's trade with foreign countries.

The tone of the book lives up to the claim made by the author, an enormous amount of material has been assembled into convenient compass, and despite the prominence of statistics the book is very readable. It is assured of a place as a handy and reliable reference book, all the more so since it is the author's expressed intention to make it an annual publication.

In detail however it is occasionally difficult to agree with the author's statements. On pages 23 and 24, for instance, discussing barley production in the Empire, he says, "The output could be increased on all sides if farmers took more interest in the cultivation of this type of cereal," an implication that surely does less than justice to Mr. Grondona's intelligence. Again, with reference to the periodic recurrence of drought that hampers the Australian farmer, he declares, "this obstacle can be overcome for the most part by conservation of fodder *and water* (reviewer's italics) in years of plenty"! More serious is his frequent insistence on the fact of a visible balance of trade adverse to Great Britain, the visible balance reckoned in terms of value and with reference to individual Empire countries. There is here real confusion of thought. Great Britain as a creditor country, receiving payment for capital invested abroad and for shipping and financial services as well as for exports, has a permanent excess of imports over exports of close on £400,000,000 per annum. The implication that this indicates Britain's unsatisfactory commercial position is entirely unwarranted, and more particularly when overseas countries are considered individually. It will of course be admitted that ill-balanced trade, reckoned in *volume*, implies uneconomic utilization of shipping space and higher transport costs than would obtain if every ship had a full cargo both ways. But value statistics give little clue to volume balance, and in any case from this point of view a "favourable" balance would be just as unfavourable to Great Britain as an "unfavourable" one. A misprint occurs on p. 251, where the Empire's share of Great Britain's exports of Food, Drink, and Tobacco is given as 43 per cent. instead of 57 per cent.

These are small blemishes on a book that can be heartily recommended.

R. O. B.

A NEW ACCOUNT OF THE EAST INDIES. By ALEXANDER HAMILTON. Edited with Introduction and Notes by Sir WILLIAM FOSTER. 2 vols. *London: Argonaut Press* 1930. 11×8 *inches;* xxxvii+259 *and* vi+225 *pages; illustrations and maps.* 3 *guineas*

Alexander Hamilton's parentage and the year of his birth are unknown: even the year of his death is uncertain. Our knowledge of him is confined so far to what he tells us about himself in his book and some references to him in the East India Company's records. He informs us that he was of a roving disposition, and, having scanty means, went to sea, where he mastered the art of navigation in the school of experience. In his younger days he had visited most of the maritime countries of Europe, Northern Africa, and Jamaica. In 1688 he shipped as a supernumerary hand on one of the East India Company's vessels to Bombay, not returning to his native land till towards the end of 1723. During this period of more than thirty-five years he was almost continuously afloat on the eastern seas, visiting, often more than once, the principal ports on the mainland and islands between the Cape of Good Hope and Japan and between the Persian Gulf and

Flores. We know of no other British sailor-merchant of the seventeenth to eighteenth centuries who spent so many years on end on those seas, who has left us a record of his experience as Hamilton has done. Had he kept a full diary and had he devoted more space to geographical details and less to personalities and tales savouring of scandal, his narrative would have gained in accuracy and in value, if it lost in piquancy. His 'Account' is the "round unvarnish'd tale" of a frankly outspoken seafaring man without any claim to scholarship or literary education. In his dedication and preface he tells us it was compiled mostly from the storehouse of his memory. He warns us, further, in regard to his sketches that he understood "but little of the pencil" (as indeed is obvious), and that even they had been drawn from memory! It is scarcely a matter for surprise therefore that when subjected to the close scrutiny they have undergone at the hands of Sir William Foster, his statements should have been found to contain inaccuracies. These blemishes should not be held to impugn the veracity of Hamilton's narrative as a whole: they are largely superficial, and the foundation remains solid. He supplies valuable information regarding the then conditions of navigation and trade in the harbours of the East, the products and manufactures of the countries visited, the prices of commodities, coinage, weights and measures current, the habits and customs of the peoples, and other matters, and he frequently gives us an insight into the methods of administration, especially at the ports; while the accounts of his journeys from Lahori Bandar to Tatta and from Ganjam, *via* Puri and Cuttack, to Balasore (practically his only land journeys); of the Nicobar Islands and their inhabitants; of Pegu, Johore, and Siam, all furnish information not available elsewhere. The description of his trial at Ayuthia on an indictment of using treasonable language in respect of the king is most interesting as showing how judicial proceedings were conducted.

Hamilton abhorred injustice and hypocrisy, whether on the part of men of his own nation or of any other nation. He shows, moreover, remarkable freedom from any colour prejudice. He commends or condemns impartially all who observed or transgressed his code. His comments on Job Charnock are classic. His unfavourable verdicts upon Sir John Child and Joseph Collet may well have been better founded than the records of the East India Company would seem to indicate. Of his firmness, at times of a rather autocratic nature, we have several examples, as, for instance, his seizure of a Chinese junk at Johore in satisfaction of a claim against certain merchants of Canton, his blockading of the Achin harbour, and his treatment of the Deputy-Governor of Mocha. His fighting qualities are shown in the defeat of three pirate vessels on his voyage from Malabar to Sind, his rout of Baluchi and Makrani freebooters on his way to Tatta, his sanguinary encounter with eight pirate vessels off the coast of Kathiawar, when his thigh was pierced by a lance, and the leading and effective part he played in the defence of the Gombroon factory in 1721.

The notes—so essential for the elucidation of Hamilton's book—have involved much labour, and disclose that profound and accurate knowledge which the editor possesses of all the literature, both published and MS., dealing with the period concerned. Practically all the obscurities in the text have been cleared up. To this research we owe the discovery, and reproduction as frontispiece, of the only extant letter written (in a strikingly good hand) by the author. The seal that closed this letter is also reproduced, it should be noted, on the front of the covers of these handsome volumes. One or two further suggestions, which occur to the reviewer, may be of interest to students.

Hamilton's Poremain (I, 82, 233) is the Fūr Miān of the Arab geographers and the Por Miane of the Portuguese. It has been named after, instead of before, Mangrol, evidently by a slip of memory. Hamilton does not appear ever to have

landed at either of these ports. His Bottadaar (I, 95, 235) represents *butedar*, a word of Persian origin, meaning "sprigged" or "flowered" material, *e.g.* muslin, cloth. Hijli and Khajuri (Hamilton's Ingellie and Kidgerie, II, 3, 173) were originally islands, as we learn from the earliest accounts and maps. Alluvial deposit has silted up many channels on that side of the Gangetic delta since Tamluk and, later, Pipli were ports. As regards Tresindi (II, 4, 173) Hamilton seems to give as an alternative name Cottrong, which represents the modern Kotrang in the Hugli district. *Souling*, or "impaling alive," as he explains the term, is not an English word. He is here employing the local term, *sula*, of the Malays (the Sanskrit *śula*), the ordinary word for a stake on which criminals were impaled. His Ponteamass (II, 105, 191), near the mouth of the Kankao river in Siam, is marked as "Pontiam" on Kitchin's map in Ives' 'Voyage' (1773); as "Cancar or Ponthiamas (a Chinese Colony)" on Sayer's map of 1778; and as "Pontiamo" on the map in Crawfurd's 'Indian Archipelago.' His Bansack (*ib.*) is the western outlet of the Mekong, still known as the Bassac. His Quadrol (II, 109, 192) could scarcely be intended for Koh Tron, having regard to the area, and distance from Ponteamass, given. It seems to have been one of the Pirate Islands, *i.e.* that marked Pulo Quatrol on Norie's chart of 1821.

The index, though not full, is very useful; and the volumes have been admirably printed. The only matter for regret is that the price of this edition places it beyond the means of the ordinary research worker. C. E. A. W. O.

OXFORD UNIVERSITY EXPLORATION CLUB. 2nd Annual Report (1929–1930). *Oxford* (1930). 9×6 *inches;* 20 *pages*

We welcome the appearance of the second Annual Report of the Oxford University Exploration Club as evidence of the vitality of this young Society, which, as Dr. Mill points out in our Centenary 'Record,' may fairly be considered as the legitimate offspring of our efforts to establish geographical teaching in the Universities.

Its principal contents are a good general account of the organization and doings of the Oxford University British Guiana Expedition of 1929, which was led by Major R. W. G. Hingston, who had accompanied an Oxford expedition to Greenland in the previous year. An account of Mr. Weatherby's expedition in 1930 to Norwegian Lapland, a region little known and difficult to traverse in summer time, is held over to the next issue.

As Major Hingston has already lectured to the Society on the British Guiana results (*G.J.*, 76, 1930, pp. 1–24) we need not dwell here upon the Club Report. But we congratulate all concerned on the business-like way in which the accounts are again presented. £1375 was collected, of which £204 was handed back *pro rata* to the subscribers; so that the expedition cost £1170, or just under £100 per head. It must be borne in mind that the Government of British Guiana, especially the Forestry Department, rendered great assistance, which is duly acknowledged in the Report. The custom of publishing accounts is admirable in itself, and is of practical value as a guide to other travellers.

THE MONTHLY RECORD

THE INTERNATIONAL GEOGRAPHICAL CONGRESS, SEPTEMBER 1931

In the *Journal* for September 1930, p. 269, we published a summary of the programme for the International Geographical Congress which will be held in Paris from September 16 to 25. We understand that these letters of invitation have been sent to each member of the British National Committee of Geography, but since the Congress is open to all Fellows of the Society we have asked that a supply should be sent to the House of the Society for the use of Fellows who are not members of the National Committee.

The President of the National Committee has received from Professor Emmanuel de Martonne a letter dated 3 December 1930 to the following effect: He counts on Great Britain taking an important part in the Congress and desires to be informed as soon as possible of the names of the scientific men who will participate. He appeals to participants to inscribe their names at once, giving the following reasons which make early adhesion imperative. The preparation of the Congress will be especially laborious because an effort will be made to delimitate the field of discussion and to obtain upon a definite number of points groups of coherent contributions. An effort will also be made to organize varied excursions, giving an opportunity for fruitful opinions in the field. To prepare the necessary guide books, and to make the organization as perfect and as economical as possible it is very necessary to have early information as to the numbers which will take part. For the moment he requests only an adhesion in principle in order to judge which excursions should be organized. Similarly he asks that those who propose to offer communications to the Congress shall notify him in principle in order that the section may be properly arranged. Finally, it is remarked that even if a member who has inscribed his name and paid the necessary 125 francs is unable to be actually present at the Congress he will receive good value for his subscription in the publications, which promise to be particularly important and which will not be put on sale. There are the accounts of the meetings, the reports of about eight commissions of the Union, the guide books to the excursions, and special publications, such as the Atlas of France prepared by the French National Committee of Geography. The Committee especially wish to avoid a large number of subscribers at the last moment, and therefore ask that they may have at least half of the names in the first two or three months of 1931.

FLATS AND CHANNELS ON THE NORTH KENT COAST

Dr. H. Muir Evans, whose researches into past changes affecting the sand-banks and channels off Yarmouth and Lowestoft were referred to in the *Journal* for December 1929 (vol. 74, p. 606), has continued his studies of similar features farther south, on the coasts of Essex and Kent. Having dealt early last year (*Mariner's Mirror*, January 1930) with the labyrinth of islands, channels, and flats on the Essex coast (using the nomenclature as before to help in tracing changes that have supervened since early times) he comes in the latest article (*Ibid.*, October 1930) to the north coast of Kent, which is of special interest in connection with the old inland passage for ships within the islands of Sheppey and Thanet, which enabled them to avoid the open sea until Sandwich was reached. On this coast too a great variety of at first sight unintelligible names are given to the sands, and Dr. Evans' first task is to endeavour to find their original meanings. In the one group of the Margate sands we have the names Wedge, Searn, Woolpack, Last, Spell, Gore, and Reculver. Searn is explained as akin to "sere," dry,

meaning a sand dry at low water. Woolpack presents difficulties, but analogies from the Dutch and Belgian coasts suggest that it refers to a line of sandhills on the margin of a low-lying coast. Last may have a like origin with Foot, and Shoo or Shoe, applied to similar features, but an alternative is that it is akin to "Lathe," used for the major divisions of Kent, derived from the Saxon *laeth*, land. Spell, with allied terms, seems to have the sense of splinter, the sands so called being narrow and pointed. For Horse Dr. Evans has an ingenious explanation which connects it with the grant to a landowner (of which the tradition survives) of a privilege extending into the water as far out as a man can ride in on a low ebb. For Reculver and Minnis he quotes the fantastic explanations put forward by one writer, but is careful to add the saner views of recent students. Coming to the evidence of changes off Reculver and in the old estuary of the Wantsum, Dr. Evans examines the early delineations of Saxton and Waghenaer, comparing them with the later charts and maps of Van Keulen, Andrews and Dury, and others, down to the survey by Graham Spence in 1808. He is perhaps a little inclined to trust too much to the evidence of the early maps, for he quotes Lea's edition of Saxton (*c.* 1690) as indicating that there was still an island in the estuary of the Wantsum at that time, whereas Lea's version was from the same plate as the original of 1579, with but partial revision. A general conclusion is that formerly there were very extensive flats north of Reculver, but that as the mouth of the Wantsum silted up the tidal stream had a clear run along the coast (instead of entering the river) and washed away a good deal of the Reculver Cliffs, at the same time forming a new channel parallel to the coast-line. A final section deals with the Yenlade, a name which is applied in various forms to different parts of the old inland passage; and Dr. Evans suggests tentatively that the wide application of the name may indicate the former existence of a continuous stream, separated from the open sea by a line of sands with but one exit northwards.

WATER MOVEMENTS IN THE STRAITS OF DOVER

It will be recalled (*Journal*, 75, 1930, p. 201) that since June 1926 current measurements from the Varne Lightvessel (50° 56′ N., 1° 17′ E.) have by means of a drift indicator been continuously recorded. By the end of 1929 it was possible to look back upon some 1170 days of observations and to find that all the varying to and fro water movements in the Straits of Dover during the three years effected the same overall transport of water as would have been brought about if a persistent current of 2·7 miles a day from Channel to North Sea had prevailed unchanged throughout the period. A further paper by Mr. J. N. Carruthers, of the Fisheries Laboratory, Lowestoft, deals with exceptional currents in the winter of 1929–30 (*Journal du Conseil Internat. pour l'Exploration de la Mer*, vol. v, No. 2, 1930). Last winter provided not only the most strongly accentuated flow in the normal direction but also the most marked "reversal" recorded since the observations began, and the attendant meteorological conditions are illustrated with weather charts.

It will be remembered that the early part of last winter was excessively wet and stormy, culminating in the great storm of January 12. As a result of this the transport of water from English Channel to North Sea during November, December, and January was almost two and a half times as great as during any of the three previous corresponding periods, amounting in December to 11·4 miles a day. A change to north-east winds came in February, which was only a moderately cold month in the south but very cold in the north with skating and much snow. This change was reflected in the Straits of Dover by a very abrupt change over from unusually strong east-north-east-flowing to unusually strong

west-south-west-flowing currents. Weather charts for January 7 to 12 are contrasted with others for February 4 to 10, low pressure over the Faeroes with south-west winds over the British Isles in the former case, and high pressure over the Faeroes with north-east winds over the British Isles in the latter case, being the determining feature. Actually the strongest flow in the normal direction appears to obtain when the wind is more southerly over the North Sea, and south-westerly over the Channel, this disposition of wind favouring the greatest increase of the flood stream.

The month of December 1929 is regarded as very exceptional by Mr. Carruthers, since in the three previous Decembers the reversals were so numerous as to render each of them a month of almost no flow. But a longer term of years will show that a December of the stormy type of 1929 occurs more often than a notably fine one like 1926, or an intensely cold one like 1927.

THE IRISH ESKERS

The origin of the mound or ridge-like accumulations of stratified material known in Ireland as eskers is discussed by Mr. Richard Foster Flint in a paper contributed to the *Geographical Review* for October 1930. The great ridges, broad hummocky complexes, and isolated hillocks of sand and gravel rise abruptly from the monotonous surface of the central limestone lowland of Ireland and form the most conspicuous feature of the landscape. The work of many investigators has shown that while the eskers are very irregular and variable they all consist of stratified sediments, usually horizontally stratified. The material was deposited chiefly in ponded water, but in water ponded at various levels, though some of it is fluviatile. All the sides of every form appear to have been retained by walls of ice that melted back slightly throughout the period of accumulation, causing slumping and overbuilding of the beds of the growing mass, but no erosion of the accumulated sediment took place after the building ceased. The inevitable conclusion from all the facts gleaned is, according to Mr. Flint, that the Irish eskers are the great casts of a system of lake-filled and stream-filled cracks that seamed a decaying ice-field. The facts can only be explained by a mass of stagnant ice standing over the whole of the central lowland, its entire surface seamed with crevasses and tunnels, the former filled with standing water, and some of the latter furnishing conduits through which flowing water connected the crevasses. Had the ice not been stagnant the slightest movement of the mass would have destroyed or disturbed the delicate system of detrital deposits accumulating within and beneath it; and had it not melted away in place any withdrawal of an ice front would have discharged streams of meltwater, trimming and scarring the weak gravel slopes. Where the southern edge of the ice abutted against the northern face of the southern mountains a number of marginal lakes were formed, and others developed about the major "nunataks" which were formed by the various "slieves" which relieve the surface of this part of Ireland. The Irish ice radiated from centres in Connaught and Donegal, and met the Scottish ice, which came over the floor of the Irish Sea, and the whole thus formed a stagnant pool in the centre of the country in hydrostatic equilibrium. The phenomenon presented in Central Ireland is not unique, for the same writer in a previous number of the *Geographical Review* discussed the occurrence of a similar stagnation over a much larger area of the last ice sheet in north-eastern North America.

DESTRUCTION OF FISH IN NORTH SEA BY COLD IN 1929

There does not appear to have been any winter more rigorous in Eastern Europe in anything approaching modern times than the recent one of 1928–29. The Baltic was of course heavily blocked with ice as usual in hard winters; but

at the end of February 1929 the North Sea was frozen for several miles off the German and Danish coasts, which is a very rare event, and even on the English side pancake ice was formed for a day or two along the coast of Essex, although this was quickly dispersed by warm water associated with the tidal streams from the open ocean flowing down the east coast. An interesting effect of this cold in the North Sea was the heavy mortality among fish, an account of which is given by Lieut.-Commr. J. R. Lumley, R.N., of the Fisheries Laboratory, Lowestoft (*Marine Observer*, January 1931). During February and March 1929 large numbers of dead fish of all kinds—eel, turbot, sole, sprat, plaice, cod, crabs, lobsters—were caught by British and Danish fishermen in the North Sea, and it was not always at once that their unwholesome condition was discovered. Another interesting effect of the cold was the altered distribution of the fish, the fact that fish have the habit of migrating into deeper water in cold weather being well illustrated. Thus flounders, normally an estuarine fish, were driven out of the rivers by the arctic cold, and caught much more abundantly than usual in the North Sea, and whilst the sole fishery off the west coast of Denmark was a complete failure there were very heavy catches near the Dogger Bank. A map shows the areas in the North Sea where dead fish were found, the biggest being in the vicinity of the Heligoland Bight, and another map shows the surface water temperature in the North Sea at the end of February 1929. This was at 32° F. or below in the eastern part of the North Sea.

It appears that fish are very susceptible to abnormal temperatures. A case of wholesale destruction of fish by cold, quoted by Lieut.-Commr. Lumley, is that of March and April 1882 on the east coast of North America, but a more recent occurrence, not mentioned, when heat and not cold was the fatal condition, was in the early months of 1925 off the coasts of Peru and Chile, associated with a deflection off the warm Humboldt counter-current El Niño and torrential rains along that normally arid coast (see *G.J.*, 67, 1926, 573).

GEOGRAPHY IN GERMANY

In the beginning of 1929 the pupils and friends of Hermann Wagner planned a volume of studies to be presented to him on his ninetieth birthday. His death later in the year has caused it to assume the character of a memorial volume ('Hermann Wagner Gedächtnisschrift: Ergebnisse und Aufgaben geographischer Forschung,' *Ergänzungsheft* Nr. 209 *zu Petermanns Mitteilungen*, 1930). It is not possible to refer here in detail to the thirty studies contained in this rather formidable volume, but, in addition to drawing attention to it, it may be worth while to give a general idea of its contents as illustrating present tendencies among German geographers.

As a tribute to Professor Wagner's universal interests, the contributions purposely deal with rather general subjects grouped under five headings, the largest of which covers Human Geography. But for this expressed intention one might be inclined to criticize it from that point of view, especially as the papers dealing with more restricted subjects seem likely to be the most valuable to students. For example, K. Sapper's examination of cartographical progress in Central America sets forth the varying degree of trustworthiness of existing material, outlines the work done in the last ten years, and indicates fields for further work, which he concludes must be left largely to the labours of individual scientific travellers. H. Lautensach's paper performs similar services for the regional study of Portugal. He shows how Portuguese students have to some extent been diverted from almost exclusive study of their overseas possessions to the homeland, largely through the labours of the late Sr. Silva Telles. He then summarizes all existing sources for regional studies, an important consideration

being the existence of a complete topographical survey of Portugal on the scale 1:100,000.

In the first section, O. Jessen argues for a return to the "comparative method" in geographical description and research. He considers that there is at present a tendency to over-emphasize evolution and structure of land forms in regional description, and advocates a more subjective attitude on the part of the geographer, even in the actual phraseology of the writing. Here however he appears to be invading the sphere of literature. He also considers that the comparative method replaces to some extent the practical laboratory work denied to the geographer. He is aware that the reaction to the comparative method in the past was due to the danger of facile generalization and of trust in circumstantial evidence, and concludes with the admonition that observation must always be the basis of geography.

The section on cartography includes papers by A. Herrmann and K. Kretschmer on Marinus of Tyre, and on the characteristics of mediaeval world-maps, particularly of the T-O type. M. Eckert urges the claims of cartography as a complete discipline in itself, especially for its value as a training for observers. The physical section contains a classification of ice-forms by E. von Drygalski, based upon their genetic relations to land and sea, the three main divisions of land-, shelf-, and sea-ice being subdivided according to the mass of ice involved, and the nature of underlying or adjacent land forms. In this classification the influence of the Antarctic research of the present century is strong, particularly in emphasizing the necessity for a thorough consideration of sea-ice, and in revealing the variety of land forms on the Antarctic margin. Most of the other papers are devoted to tectonic or geomorphological problems.

In the human geography an interesting paper is contributed by G. Friederici on the penetrability of the North American continent to the European discoverers, to form the basis of an historical geography of the continent. It is well-documented, and supports the author's thesis that the difficulties of the first settlers in New England have been exaggerated by earlier writers. The advance of the French in Canada and in the Mississippi delta region was much more difficult in comparison. The idea that the greater part was one dense forest, which was spread by some of the early settlers, is shown to have been inaccurate. In later times it is interesting to note the surprise of the trans-continental migrants *via* the South Pass at the ease with which the supposedly difficult barrier of the Rocky Mountains was passed.

COAST-CHANGES IN THE ADRIATIC

We have received from Professor L. de Marchi the reprint of a paper contributed by him to the *Memorie* of the Geological Institute of Padua University (vol. 8, 1930), in which he discusses the recent marked retreat of the northern Adriatic coast just east of the mouth of the Piave, and its causes. Within the last few decades not only has a chain of dunes, several metres high, been demolished, but the under-water contours along the coast have become decidedly steeper. As there is no evidence either of a diminution of rainfall with corresponding reduction of the amount of material carried by the rivers, or of lessened transport of material along the coast sufficient to account for the loss, the only possible explanation, Professor de Marchi holds, is a change in the direction of the winds with a consequent increase in the destructive action of the tides. Local observations have shown that the most powerful erosion is exercised by tidal currents from directions between south-east and south-west, caused by winds from the south, and the record of the prevalent winds in this part of Italy from 1876 to 1921 shows that apart from the first decade of that period the years in which southerly

winds have prevailed have been far the more frequent, so that the attribution of the destruction of the coast to this ultimate cause appears justified. The greater prevalence of southerly winds is held to be a part of a more general climatic change, marked by a diminution of the variation between winter and summer temperatures and due to a reduction in the barometric gradient between the high subtropical and the low circumpolar pressures. For the sake of comparison Professor de Marchi examines the changes recorded at the mouth of the Po during the same period and finds that here too a retreat of the shore-line appears to have set in about 1890, following on a previous advance. A somewhat similar course of events is shown to have taken place near the mouth of the Arno, as brought out by a study of Professor Toniolo, who holds that the recent retreat of the coast noted in these cases is not evidence of a continuous process in this direction, but marks a temporary phase corresponding to a fluctuation of climate and likely in course of time to be reversed.

THE LOESS OF CHINA

In the *Geological Magazine* for October 1930, Dr. George B. Barbour, of Yenching University, Peking, analyses the Loess problem on the basis of recent studies coordinating results of research upon various lines. The term "loess" has become very elastic, but in China it should refer to a highly characteristic deposit of a certain age. The loess blanket is not stratified and conforms closely to the general contouring of the buried pre-loess topography, filling up the gullies, covering the minor elevations, laying deposits in the depressions, and thinning out up the flanking slopes of the higher ridges. Typical loess is most characteristic of the northern province of China, but does not exist across the Mongolian frontier. Near the latter deposits of the same age become sandy, and near the maritime zone there is evidence of the re-working of the loess by water. The gist of Dr. Barbour's argument is to confirm von Richtofen's contention that the loess is of Aeloian origin and to demonstrate that the deposit was found under special climatic conditions corresponding to two epochs in the Pleistocene, viz. the Günz-Mindel and Riss-Würm glaciations. The facts, it is held, indicate that at these epochs there was an intensification of the present-day climatic conditions of North China such that the winter north-west winds from arid Mongolia were more strongly developed, and the summer south-east monsoon winds weaker. Even to-day the dust storms brought by the winter winds from Mongolia carry material that is indistinguishable from the material forming the loess. But during the Pleistocene stormy winds blowing out from the Mongolian centre of high pressure drove before them disintegrated material derived from the poorly consolidated sediment of the Gobi. The coarser fraction was swept over the flat floor of the Mongolian plateau to drift into the dune-belt along the Chinese frontier, but the finer stuff was wafted out over the valleys and ranges beneath the plateau, dropped and caught up again, till finally brought to rest and fixed by such vegetation as could live on the margin of the steppes.

GEOLOGICAL CLIMATES

At the meeting of the Royal Society on 27 March 1930, Dr. G. C. Simpson opened a discussion on this subject in which Professor A. C. Seward, Sir Peter Chalmers Mitchell, Professor J. W. Gregory, Dr. C. E. P. Brooks, Dr. C. Tate Regan, and Dr. Hamshaw Thomas took part (*Proceedings of the R.S.*, Series B, vol. 106). Dr. Simpson's chief points were that there must always have been climatic zones with the equator warmer than the poles, with winter and summer as now; that these zones must have been more strongly developed at epochs of stronger radiation from the sun (when the Earth's climate as a whole was warmer)

than at epochs of weaker radiation; and that no change in the distribution of land and sea could have produced the large changes of climate inferred from the geological record. The conclusion he arrives at is that whereas the minor variations in past climates, such as the inferred inter-glacial epochs, were brought about by periodic variations in the intensity of solar radiation, the major variations such as the different Ice Ages and the alleged subtropical or tropical conditions in high latitudes can only be explained by Wegener's hypothesis of continental drift.

In the ensuing discussion Professor Gregory and Dr. Brooks maintained that Dr. Simpson had underestimated the potency of changes in the distribution of land and water. Dr. Simpson's argument is to the effect that though the distribution of land and sea within a zone of latitude affects the local annual range of temperature and the distribution of rainfall, it seldom causes local departures of more than 5° C. from the mean annual temperature of the zone, except in very small areas affected by warm or cold ocean currents, and that corresponding latitudes in the Northern and Southern Hemispheres are in remarkably close agreement as regards their mean annual temperatures. It may be noted here, what was not brought out in the discussion, that the weak point in Dr. Simpson's argument appears to be that it is drawn from analogy. The likelihood is that in any random distribution of land and water over the globe, excesses of mean annual temperature in one part of a belt of latitude will be counterbalanced by a defect in another, as we see, for instance, so strikingly illustrated by the eastern and western sides of the North Atlantic. But it does not necessarily follow that such compensating factors will operate under all possible distributions of land and water that may have occurred in the past, especially in high latitudes where snow and ice may complicate the situation and depress the temperature through the entire year.

Another interesting feature of the discussion was a reflection of the growing feeling of mistrust about the value of fossil floras and faunas as guides to past climates, which was particularly noticeable in the contributions by Professor Seward, Sir Chalmers Mitchell, and Professor Gregory. It is gradually becoming realized that we know little about the adaptability of even present-day forms of life, let alone past forms, that allied forms may differ widely in their reaction to climate, not to mention difficulties in deciphering the palaeontological record itself, and other sources of uncertainty. It was shown, for example, by Professor Gregory how coal-seams, which have always been regarded as proof of tropical conditions, can be formed in the Arctic regions under present conditions. In fact, all sorts of unjustifiable assumptions about past climates have been made through ignorance of the fact that many species of plants and animals have a much wider range of climate than that with which they are most familiarly associated. It may be added that this aspect of the subject has been very instructively handled by Mr. Edward W. Berry, of John Hopkins University, in a recent number of the *Smithsonian Miscellaneous Collections* (vol. 82, No. 6), under the title of "The Past Climate of the North Polar Region." He concludes that there is no botanical evidence of tropical or subtropical climates at any time in the Arctic, and no botanical evidence that at any time there was a lack of climatic zonation between the equator and the poles notwithstanding that at some epochs it may have been less sharply defined than at others—quite in accordance with Dr. Simpson's inference from purely physical principles.

THE BIBLICAL MOUNT SINAI

The much-discussed problem of the situation of the Biblical Mount Sinai has once more been attacked, by the Rev. W. J. Phythian-Adams, in two articles entitled "The Mount of God," in the *Quarterly Statement* of the Palestine

Exploration Fund, July and October 1930. His conclusions seem well substantiated though not entirely new. In the first article he elaborates the view that the mountain that burned with fire must have been a volcano. To some this may seem so obvious that discussion in such detail might be thought unnecessary, though there may be others who still feel bound to regard the phenomena described in Exodus as not only unusual but miraculous. The vitality of the somewhat late tradition which has placed the mountain in the peninsula now bearing its name may in part account for the latter attitude, since there are no traces of volcanic action in the peninsula. But the best authorities have long recognized that a position in that area cannot be upheld, the land of Midian, from which it cannot be dissociated, certainly lying entirely east of the Red Sea. So long ago as 1838 Dr. Beke, in the *Asiatic Journal*, expressed his conviction that long before reaching Sinai the Israelites had passed the head of the Gulf of 'Aqaba, and he placed Sinai somewhere to the north-east of that gulf. Later writers have supported this view, among them Paul Haupt, who in an article entitled "Midian und Sinai" (*Zeits. Deuts. Morgenländ. Gesells.*, vol. 63, 1909), also treated the vulcanicity of the mountain as obvious. (This discussion is not referred to by Mr. Phythian-Adams.) It is only since the explorations of Dr. Musil in 1910 in the little-known tract east of the head of the Red Sea that any attempt at an actual identification of the mountain has been possible. Mr. Phythian-Adams, in fact, regards his own contribution as merely a commentary on Musil's discoveries, though he thinks that the latter "has not perceived the significance of his own discoveries." In the volume on the Northern Hejaz, published by the American Geographical Society in 1926, Musil rejects the view that Sinai itself was an active volcano (though he seems to allow that it must have lain in a volcanic tract), and he places its site near the *sha'ib* of Al Khrob at no great distance from the head of the Red Sea proper. In identifying Sinai with the volcanic peak of Al Badr in the upland west of the Hejaz railway (in about 27° 10′ N.) Mr. Phythian-Adams seems unaware that this very identification was adopted by Musil at the time of his journey, this discovery being put forward by him as one of its most important results (*Anzeiger phil.-hist. Kl., Kais. Akad. Wissens. Wien*, 1911, Nr. xiii, p. 18). It is not clear what led him later to reconsider the matter, for his statements in 'The Northern Hejaz' are not very explicit.

It may be noted that Mr. Phythian-Adams regards the pillars of cloud and fire which guided the Israelites from the outset of their wanderings to be the emanations of the same volcano, though one is surprised that he should think them visible at a distance of 300 miles. He also considers the tables of the law to have been rock fragments discharged from the holy mountain, and thus, when preserved in the ark, partaking of its sanctity.

FRANCESCO OLIVA THE YOUNGER

Among the later makers of portolan maps three are known of the name of Oliva, and mentioned in the standard works. Francesco lived and worked in Messina, and his maps, so far as they are dated, range from 1594 to 1615, while two others of about the middle of the seventeenth century have also been attributed to him, but were more probably made by another man of the same name, as will presently appear. Giovaroni worked for a while in collaboration with his brother in Messina, but, unlike Francesco, was a roamer and produced maps at Naples, Leghorn, and Marseilles, where two maps are dated 1612 and 1614. Salvator worked in Marseilles. Very few maps signed and dated by him are known, these ranging in date from 1620 to 1635, the last date somewhat doubtful, as the original had faded and been rewritten 1535. To these three a fourth must be added, named Francesco, like the first mentioned.

The municipal library of Marseilles holds an atlas, drawn on four sheets, which could be recognized as an Oliva map, even if unsigned. The sheets are of parchment, measuring about 63 × 45 cm., all of them eked out in width by a strip of 6 to 6½ cm. broad, pasted along the longer side. The sheets were originally folded across the middle, and the crease is still noticeable and worn through in places; at some later period they have been flattened out, mounted, and backed with blue silk, which is also bound over the edges of the sheet. The atlas was acquired by purchase in 1897, but nothing is known of its previous history. The country covered by the four sheets is that of the normal portolan, the whole of the Mediterranean and parts of the western coasts of Europe and Africa; in the western ocean are shown the Cape Verde and British Isles, as well as the Azores. This sheet of the Atlantic has also the inscription, "Franciscus Oliva me fecit in civitate Marsilia," but no date is given. The map however gives a representation of the mouths of the Rhone as spreading out fanwise from the main stream, a scheme which began to appear as a tentative replacement of the ordinary portolan type about 1520; in the map at Marseilles this new form appears fully developed, and from this it may be asserted that it could not have been made earlier than 1630, more probably later, somewhere not far from the middle of the century. This, by itself, would raise a difficulty in attributing the map to the Francesco Oliva of Messina, for the latest dated map by him is 1615, and the map at Marseilles must be at least fifteen years later, probably twice as much or even more. Besides this, the map, though quite of the Oliva type of draftsmanship, differs from the style of the Messina cartographer, and the difference is not such as could be attributed to senility. The natural conclusion is that there was a second mapmaker bearing the name of Francesco Oliva, of later date and presumably a later generation, who worked in Marseilles. To this craftsman may be ascribed the atlas in the national library at Naples, regarded as of mid-seventeenth century make, and possibly that preserved in the Venice library, which bears the mark F.O. 1659, considered to be the initials of Francesco Oliva, and date of making. R. D. O.

THE ATLANTIS PROBLEM

With reference to the note in the January *Record*, p. 92, Herr Borchardt writes to point out that the statement that Professor Passarge "failed to find confirmation of the theory" needs some qualification. When Dr. Herrmann wrote his paper, from which the note was made, the results of Professor Passarge's expedition to the Shott region of Tunis had not been published. They have now appeared in the *Mitteilungen* of the Hamburg Geographical Society (vol. 41 (1930), pp. 96–122). Professor Passarge studied the geology and tectonics of the area, and concluded that there is evidence for tectonic movements in the not very remote past, as required by Herr Borchardt's hypothesis. On the archaeological side only did his researches yield negative results, for nothing was found to suggest the former existence of a highly developed culture approaching that of the legendary Atlantis. Though cautious in his conclusions, Passarge is not prepared to dismiss the whole theory as untenable.

OBITUARY

VICE-ADMIRAL SIR CHARLES WILLIAM RAWSON ROYDS, K.B.E., C.M.G.

By the death of Sir Charles Royds on Monday, January 5, the Society loses a Fellow who had great distinction in the Navy, in Antarctic exploration, and in the appointment in which he was serving at the time of his death, Deputy Commissioner of Metropolitan Police.

In this Society, of which Royds had been a Fellow since 1900, he will be best remembered in connection with his Antarctic work and in association with the late Captain Robert Falcon Scott. Polar exploration was in his blood, and his uncle, Wyatt Rawson, had been in the old *Discovery* Expedition of 1875 under Sir George Nares. With Scott, Lieutenant Royds was one of the first two naval officers appointed by Mr. Goschen to the *Discovery* National Antarctic Expedition, 1901–04. He was first lieutenant, and had all to do with the work of the men, and with the internal economy of the ship, as is customary with first lieutenants in Naval Service. The meteorological work of the Expedition was also in his charge, and although all members of necessity contributed, Royds had the duty of keeping this laborious record which embodies continuous observation for over two years in winter quarters, 400 miles farther south of any former meteorological station, as well as the many observations taken on sledge journeys, and on board ship during the navigable seasons. Personal observations were recorded every two hours in addition to the continuous graphs, and the fact that only five two-hourly records, during one heavy blizzard, were missed during the whole two years the ship was frozen in, speaks for Royds' pertinacity. All these observations, subsequently corrected, reduced, and published under the auspices of the Royal Society, were a valuable contribution to the knowledge of Antarctic Meteorology.

Describing Royds' work during the *Discovery's* first winter in 1902, Scott writes: "The day starts early with Royds for he must be up to see the men started at their various jobs. His special care is the Meteorology, and the manner in which he sticks to what might well be considered a monotonous task is beyond praise. With the care of the ship's work, the maintenance of the various instruments in good working order, and many a stray task, it can be imagined he had few idle hours. But one at least he finds—that immediately before dinner—when he goes to the piano and we have the pleasure of listening to excellent music, and feel that the debt of gratitude we owe to our only musician is no light one."

The sledge journeys under Royds were important. In March 1902 he made a journey to C. Crozier to establish a "record" post in case any other exploration or relief ships should come South. The post was not established on this occasion owing to the inexperience of the party and to extremely adverse conditions, but it paved the way for the following season. In October 1902 the journey was repeated and the record post established. It was during this journey that, Royds having injured his ankle and having deputed the final reaching of the post to Skelton, the latter with Petty Officers Lashly and Evans discovered the Emperor penguins' rookery, the first in the history of Antarctic exploration. Notwithstanding the climatic severity, Royds volunteered and carried out another journey to the same place immediately afterwards, and brought back valuable observations of the Emperor penguins, their chicks, and the first authentic eggs. He undertook another journey to this rookery in September 1903 before the return of the sun, when in spite of appalling weather, blizzards, and a temperature down to −62° F., he brought back more eggs.

Other journeys were carried out, but perhaps the Barrier journey to the south-east in December 1903 was his most important. With Royds on this occasion was the physicist Bernacchi. This journey to prove whether the Great Ice Barrier continued level in that direction was an arduous one, as the party had heavy loads to pull, were short of food towards the end of the journey, and the features of it were monotonous and wearying. Nevertheless valuable magnetic, meteorological, and other observations were obtained, and Captain Scott writes: "This journey deserves to rank very high in our sledging efforts, for every detail was carried out in the most thoroughly efficient manner."

Those who have read Captain Scott's fascinating book 'The Voyage of the *Discovery*' will know what loyal and efficient service Royds gave to his Captain. He was the hardest and most conscientious of workers, and the type of disciplinarian that receives nothing but affection and respect from officers and men. He was a splendid companion, and ever since his Antarctic days kept in close touch with nearly all the surviving officers and men. During the long Antarctic winters he provided good music in the Ward Room, played the harmonium on Sundays on the Mess Deck, organized concerts and nigger minstrels for the whole ship's company; his powerful influence for the happiness and good of everybody was always being unostentatiously exerted, and he contributed perhaps more than any one under Captain Scott to make the *Discovery* 1901–4 Expedition one of the happiest of Polar expeditions. R. W. S.

DR. JOHN WILLIAM EVANS

Dr. J. W. Evans, who died on 16 November 1930, was the eldest surviving son of Dr. Evan Evans, M.D., R.N. Born in 1857, educated at University College School and University College, London, he showed from an early age that wonderful versatility that was his most striking characteristic. His interest first centred itself on mathematics and astronomy, to such an extent that his father built him an observatory in St. John's Wood, provided with a 4-inch telescope. At his father's suggestion however he studied law, took his LL.B. and was called to the bar at Lincoln's Inn in 1878. He maintained his interest in science, geology now becoming his favourite subject, to which, after practising at the Equity Bar for ten years, he decided to devote himself. He started a detailed investigation of the Old Red Sandstone of Caithness, presenting his results successfully as a thesis for the D.Sc. of the University of London, and in 1888 entered the Royal College of Science as a student in advanced geology under Judd and his assistant Grenville Cole. At the end of his first session he was awarded the Murchison Medal, and, on the promotion of Grenville Cole to Dublin, took his place as demonstrator at South Kensington, keeping the post for two years. He then accepted a post as geologist to an exploratory expedition to Matto Grosso, Brazil, which involved him in some adventurous experiences. In 1893 he went to India, in the first place as State Geologist of Junagarh, Kathiawar, and afterwards as State Geologist and Inspector of Mines in Mysore. Returning to England in 1898, he soon set out for South America for the second time, leading an expedition to Bolivia and returning by the Madeira and Amazon. Then followed a long period of work in London, first as mineralogist to the Imperial Institute (1904–13), and lecturer in geology at Birkbeck College (1906–20), afterwards as lecturer in petrology at the Royal College of Science (now merged in the Imperial College) from 1912 to his retirement at the extended age limit in 1927. Although petrology and mineralogy were his main subjects, he contributed to all branches of geology. His early work on the Old Red Sandstone was extended into wide stratigraphical research on the Devonian of North

Devon and elsewhere. His two Presidential addresses to the Geologists' Association (1912–14) dealt with broad aspects of physical geology, and those to the Geological Society (1924–26) with broad aspects of tectonics, while both at the Geological and the Royal Geographical Society he was a constant contributor to the discussions on the most diverse subjects, often producing some searching criticism or unexpected sidelight made possible by his wide knowledge of other branches. Nor were his interests confined to geology and its closely allied sciences. In how many other directions his mind was active it is impossible to say: the present writer, having at three different times accidentally come across him in connection with three totally independent activities, was left wondering if there were any subject he could take up without finding Evans already in occupation. In his early life he had been an active Volunteer and student of military matters, and during the war, as Lieut.-Col., he took part in the training of the Middlesex Volunteers and was in charge of part of the line of defences of London. In 1926, when attending the International Geological Congress at Madrid, he received severe injuries in a motor car driven recklessly over bad roads, but soon recovered, and on retirement from the Imperial College at once resumed an active outdoor life, undertaking geological surveys in France, Egypt, and Palestine. He attended another International Geological Congress in South Africa in 1929, and then travelled from the Cape to Cairo, finally returning to England last June. His publications were innumerable, and he was honoured by the award of the Murchison Medal (his second of that name) by the Geological Society in 1922, by election to the Royal Society in 1919, and by the C.B.E. in 1923. A stimulating personality, he will be greatly missed by all who knew him. A. M. D.

MEETINGS: SESSION 1930–1931

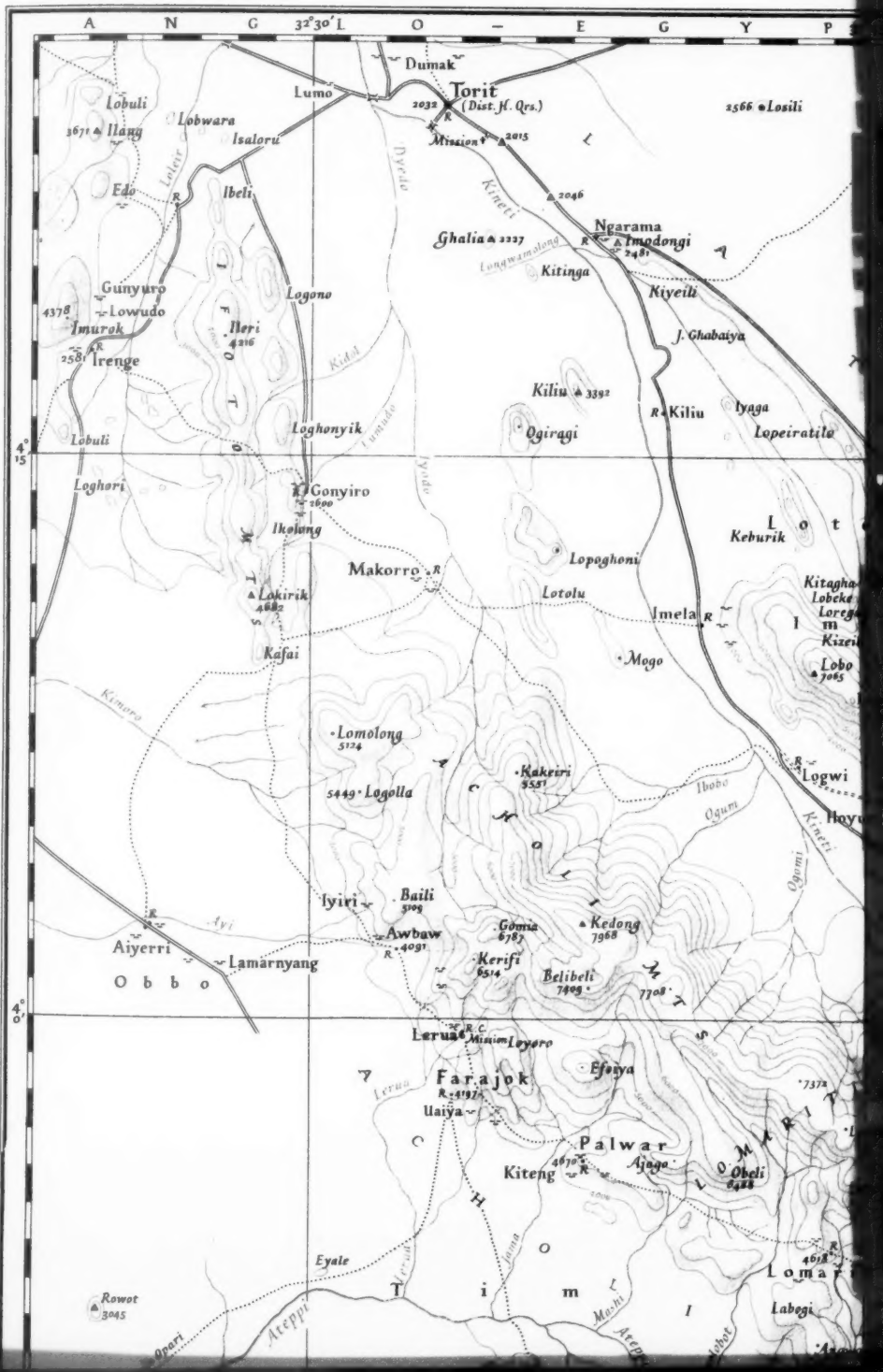
Fifth Evening Meeting, 12 January 1931. The President in the Chair

Elections: Mrs. Agnes Ruby Blake; Professor John Kaye Charlesworth; A. Cecil Clarke, A.M., M.I.M.M.; Dr. Henry F. James; Lawrence Henry Langworthy; William James Makin; Charles Wooller Marshall; Major Reginald Austin Forbes Montanaro, M.C.; Frank A. B. Sanderson; Miss Evaline Maud Sears; The Rev. Thomas Percy Skillings; Frederick Percy Spaul; Geoffrey Redmayne Turral; Captain Charles Edward Ward; Ludlow J. Weeks

Paper: The Reclamation of the Zuider Zee. By Professor J. W. Thierry

Third Afternoon Meeting, 19 January 1931. The President in the Chair

Papers: New Types of Survey Instruments: The 45° Prismatic Astrolabe, by Instructor Captain Baker, R.N.; The Tavistock Theodolite, by Major G. Cheetham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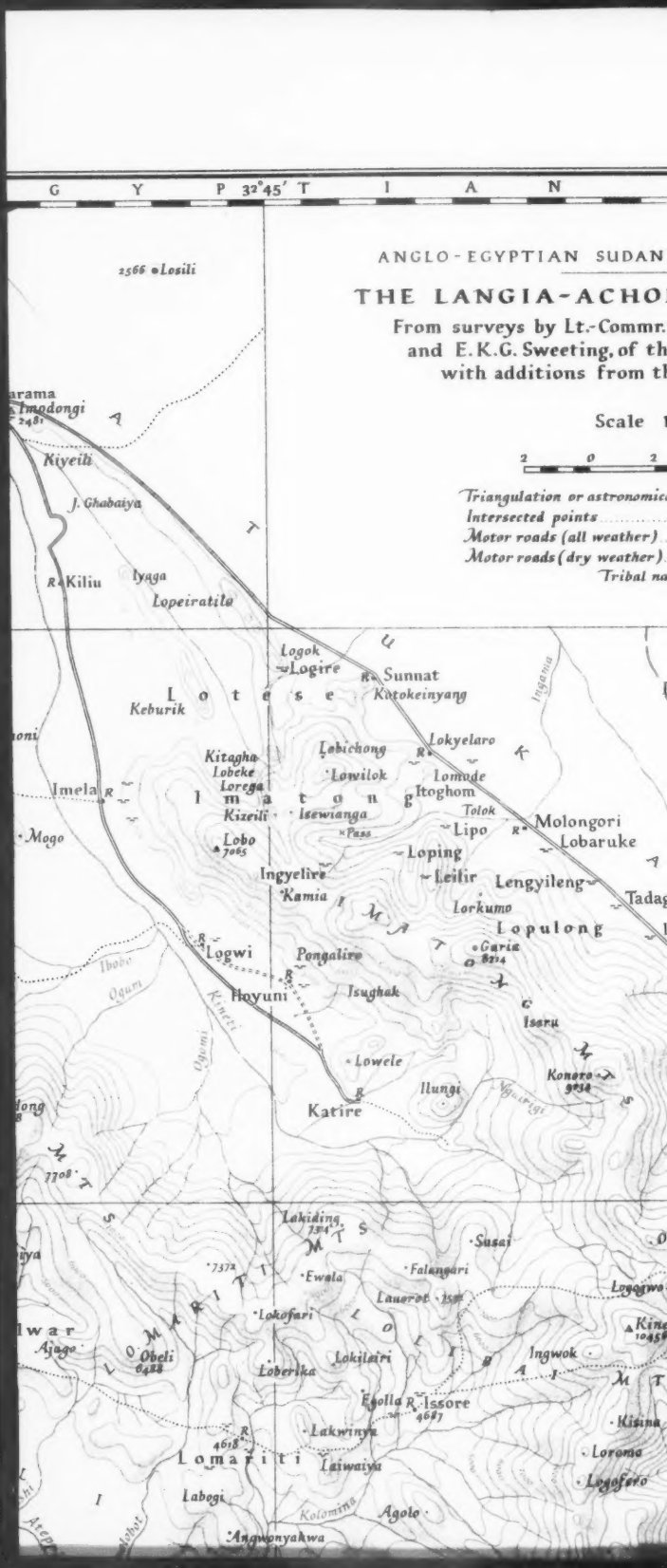
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Lokilatiri
Ingwok
Egolla
Issore
4687
Lakwinya
4618
Lomariti
Laiwaiya
Labogi
Kolomina
Agolo
Angwonyakwa
Lorome
Logoforo
Kisina

S U 33°0′ D A N

N SUDAN AND UGANDA BORDERLAND

ACHOLI MOUNTAIN REGION

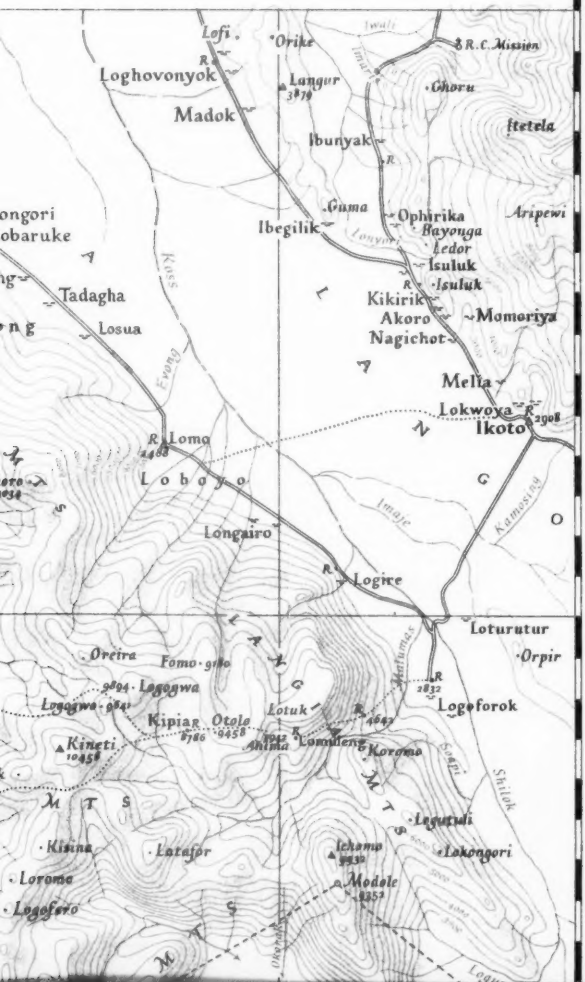
Lt.-Commr. G. T. Whitehouse, D.S.C., R.N.R.,
eting, of the Sudan Survey Department
ns from the work of other surveyors

1927

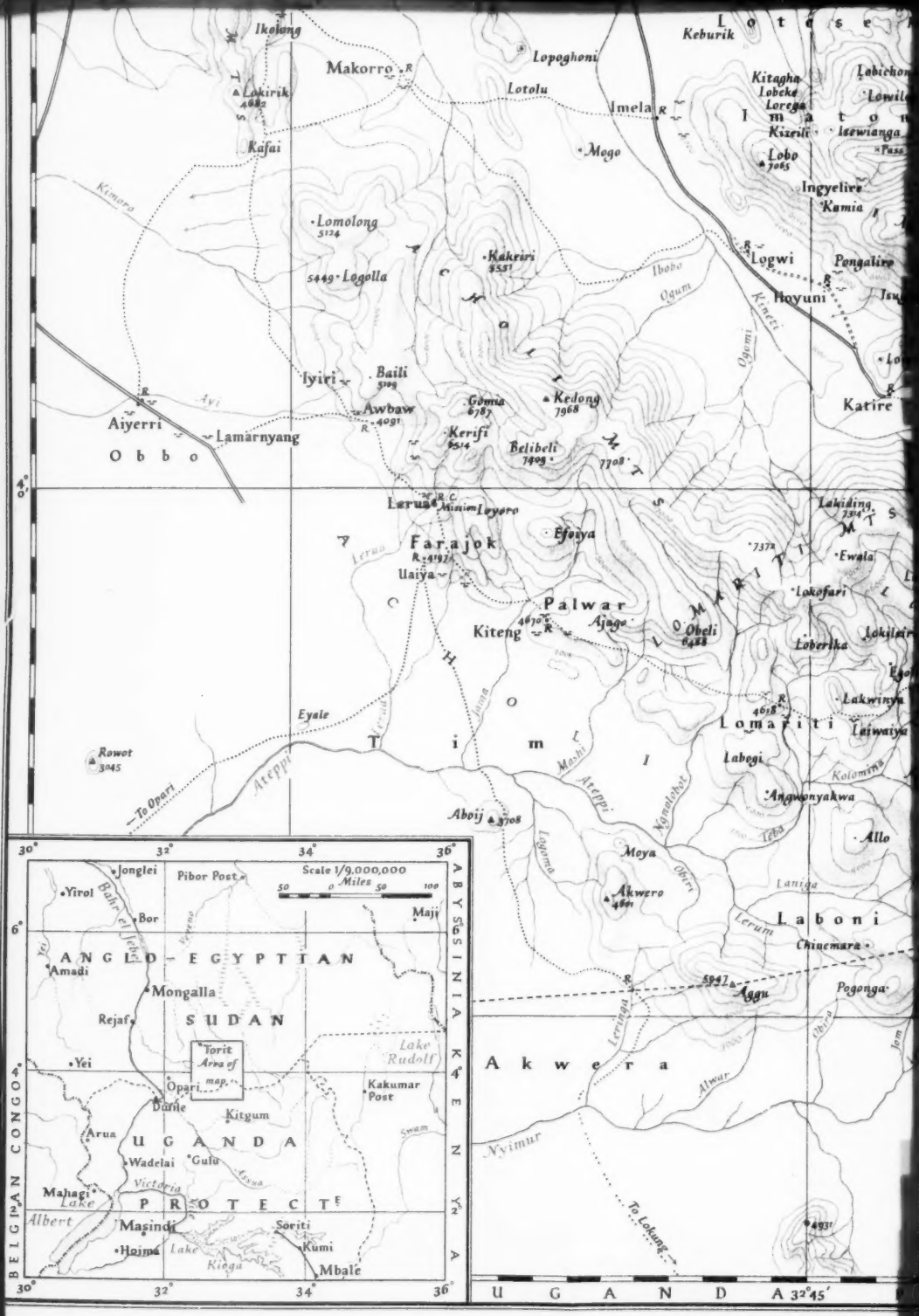
Scale 1/300,000

Miles
0 2 4 6 8

or astronomical points ▲ Tracks
ints • Hills (village) ~
all weather) Rest house R
dry weather) Heights in feet
Tribal names LANGO



30°
9°
BELGIAN CONGO.



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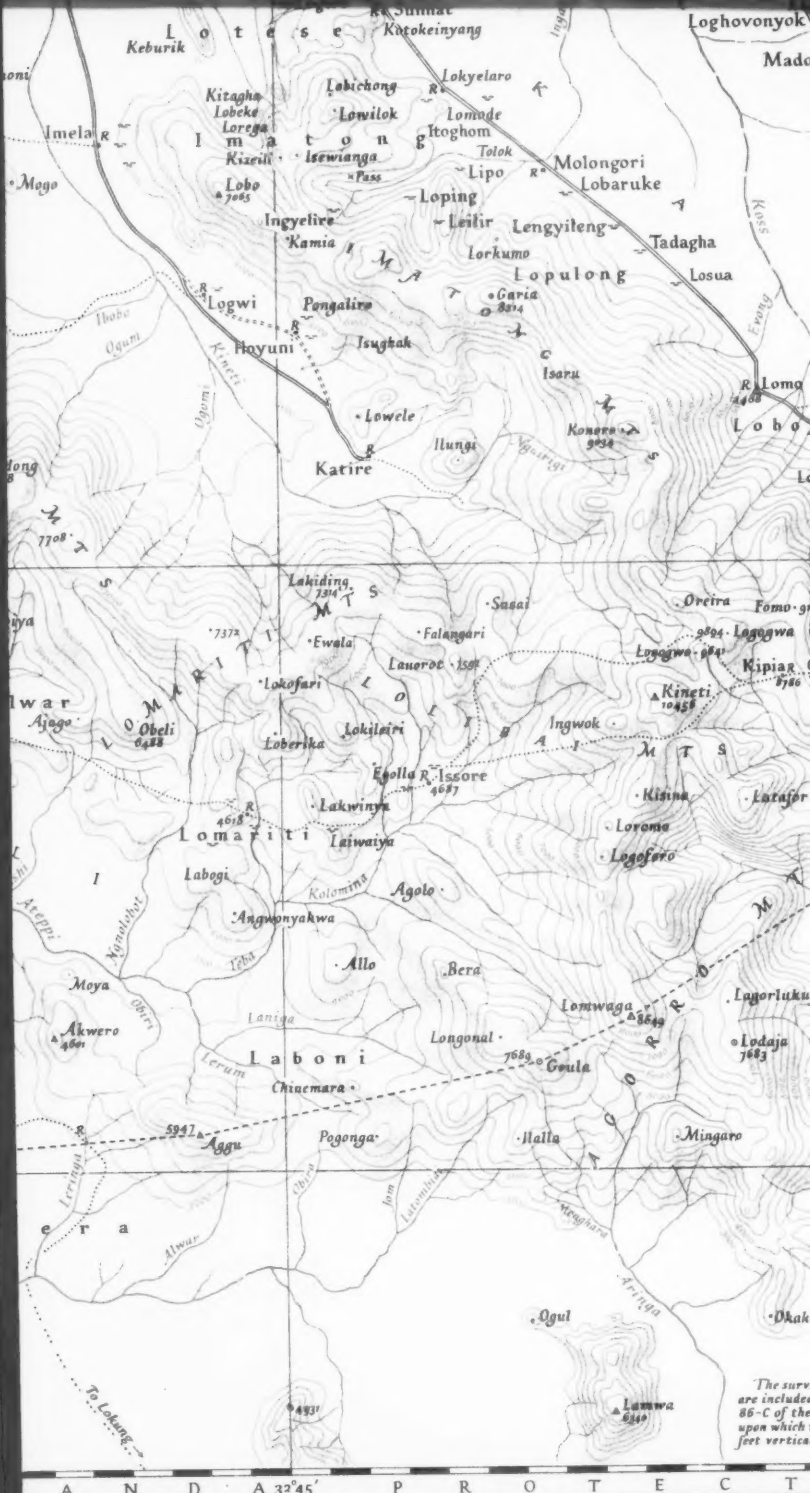
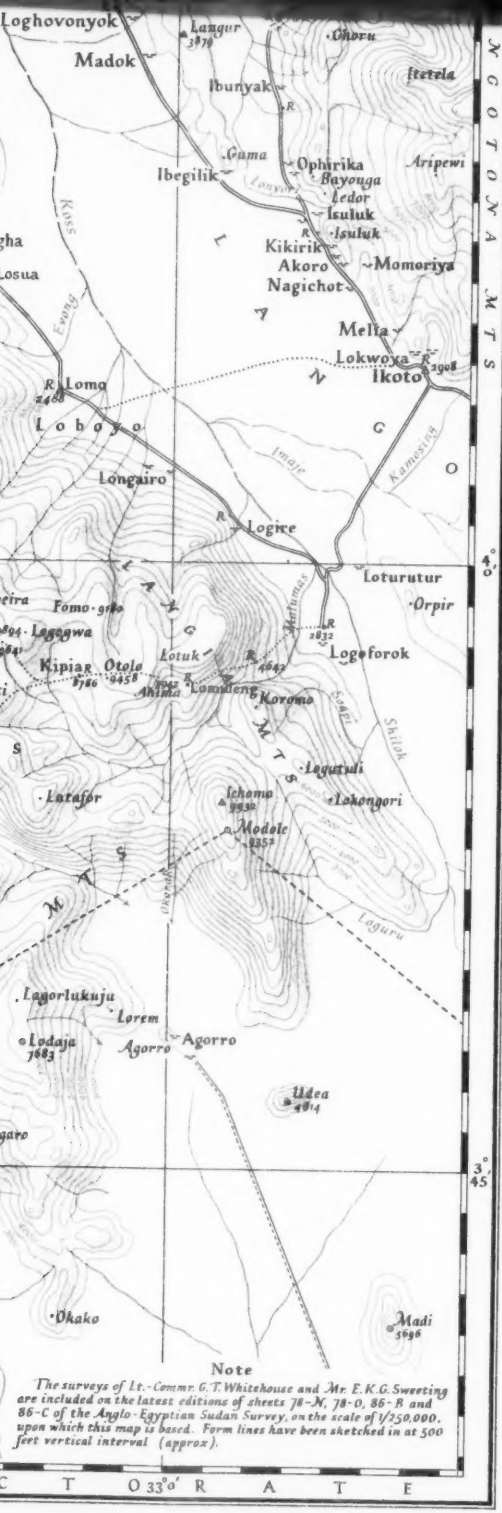


The surv
are include
86-C of the
upon which
feet vertica

A N D A 32°45′ P R O T E C T

Published by the Royal Geographical Society



Note

The surveys of Lt.-Comm. G. T. Whitehouse and Mr. E. K. G. Sweeting are included on the latest editions of sheets 78-N, 78-O, 86-B and 86-C of the Anglo-Egyptian Sudan Survey, on the scale of 1/250,000, upon which this map is based. Form lines have been sketched in at 500 feet vertical interval (approx).

LANGIA-ACHOLI MTS
Whitehouse